

HT312B and HT315B

Operating Manual

Genelec HT312B and HT315B
Active 3-Way Speaker Systems

GENELEC®



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System

The Genelec HT312B and HT315B are three-way active home theater loudspeaker systems including drivers, multiple power amplifiers and active crossovers. The systems are designed for room volumes up to 175 m³ / 6200 ft³ (HT312B) or 250 m³ / 8800 ft³ (HT315B) with maximum listening distances up to 6.1 - 7.6 meters (20-25 ft). They are designed to perform well both as free-standing or flush mounted into the wall structure.

The unique Directivity Control Waveguide™ (DCW™) Technology developed by Genelec provides stable and extremely accurate imaging and frequency balance even in difficult acoustic environments. Designed as active loudspeakers, each system contains an individually matched amplifier unit with multiple power amplifiers, active crossover filters and protection circuitry. The fast, low distortion amplifiers are capable of driving a stereo system to peak output levels in excess of 124 dB SPL at 2 m (HT315B) or 123 dB SPL at 2 m (HT312B) with music material. Versatile crossover controls allow for precise matching of the loudspeakers to different acoustic conditions.

Drivers and cabinet construction

On the HT315B the low frequencies are reproduced by an 385 mm (15") bass driver loaded with a 110 liter vented box. The -3 dB point is 33 Hz and the low frequency response extends down to 29 Hz (-6 dB). The HT312B features a 305 mm (12") bass driver in a 65 liter vented box with the -3 dB point at 35 Hz and -6 dB at 32 Hz.

Both models share the same midrange and high frequency driver layout with a proprietary 130 mm (5") direct radiating cone for the MF and a 25 mm (1") metal dome for the HF loaded by proprietary Directivity Control Waveguide. All drivers are magnetically shielded.

Amplifiers

The amplifiers, crossover filters and power supply of the HT312B and HT315B are integrated into a 19" 3U RAM4/5 rack module.

The bass, midrange and treble amplifiers of the RAM4 amplifier powering the HT312B produce 180 W, 120 W and 120 W of short term power. Respectively, the RAM5 ampli-

fier provided with the the HT315B produces 400 W, 120 W and 120 W. The amplifiers are designed to operate at very low THD and IM distortion values and incorporate special circuitry for driver overload protection and amplifier thermal protection.

Neutrik Speakon connectors are included to facilitate wiring and system connection at customer facilities. Each amplifier is factory calibrated with the individual loudspeaker they are shipped with in order to eliminate the effects of component tolerances and ensuring consistent quality and long term reliability.

Crossover filters

The active crossover network consists of three parallel bandpass filters. The crossover frequencies are 410 Hz and 3.0 kHz on the HT315B and 420 Hz and 3.2 kHz on the HT312B. Bass, midrange and treble Level controls with 1 dB steps are included in the crossover to obtain uniform frequency balance in different acoustic conditions. The low frequency Tilt and Roll-Off controls both have four 2 dB steps to allow refined low frequency response tailoring. The crossover network is driven by an active balanced input stage, fed by a 3 pin XLR connector. Variable input sensitivity allows for accurate level matching to the signal source output.

Installation

Each loudspeaker is supplied with an amplifier unit, a mains cable, Neutrik Speakon connectors and an operating manual. Once unpacked place the loudspeaker in its required listening position, taking note of the line of the acoustical axis (see Figure 1).

Sufficient cooling for the RAM4/5 amplifier must be ensured. The cooling fan on the amplifier back panel draws air through the filter on the left side panel and blows the warmed air to the space behind the amplifier. The airflow must not be obstructed. Note also that the space behind the amplifier must either be ventilated or sufficiently large to dissipate heat so that the ambient temperature does not rise above 35 degrees Celsius (95°F).

Before connecting up, ensure that the mains switch is off (see Figure 2). Check that the mains voltage selector is correctly set to your local voltage.

Connections

Each system is delivered with two 8-pole and two 4-pole Speakon cable connectors for constructing signal cables of desired length.

Measure the required lengths of 8-pole and 4-pole cable and secure the connectors on them pin to pin. See Table 1 below for recommended cable thicknesses. The whole cable should have an outside diameter of 8 to 20 mm (5/16" to 13/16") to fit in the Speakon connector.

Alternatively, pre-terminated lengths of cable are available from Genelec.

Be sure not to mix the amplifier/loudspeaker pairs when installing multiple loudspeakers at the same time. Each amplifier and loudspeaker delivered together are marked with the same identification number and calibrated together for optimal performance.

Audio input is made via a 10 kOhm balanced XLR connector, but unbalanced leads may be used as long as pin 3 is grounded to pin 1 of the XLR. Once connection has been made, the loudspeakers are ready to be powered-up.

Access to the front panel controls

The decorative front panel of the amplifier is held in place by guide pins and two magnets. To remove the panel, pull it straight out.

Setting the input sensitivity

Adjustment of the input sensitivity of each loudspeaker can be made to match the output of the decoder or other signal source by use of the input sensitivity control on the amplifier front panel. A small screwdriver is needed for the adjustment. The manufacturer default setting for this control is -6 dBu (fully clockwise) which gives an SPL of 100 dB

Cable gauge	Max. length
2,0 mm ² (14 AWG)	30 m (100 ft)
3,3 mm ² (12 AWG)	40 m (130 ft)
5,3 mm ² (10 AWG)	60 m (200 ft)

Table 1. Recommended cable thicknesses for different lengths of cable

Loudspeaker mounting position	Bass roll-off	Bass tilt	Bass level	Midrange level	Treble level
Free anechoic response	None	None	None	None	None
Free standing in a damped room	None	-2 dB	None	None	None
Free standing in a reverberant room	None	-2 dB	-2 dB	None	None
In a corner	-2 dB	-2 dB	-2 dB	None	None
Flush mounted	None	None	-4 dB	None	None

Table 2. Suggested tone control settings for different acoustic environments

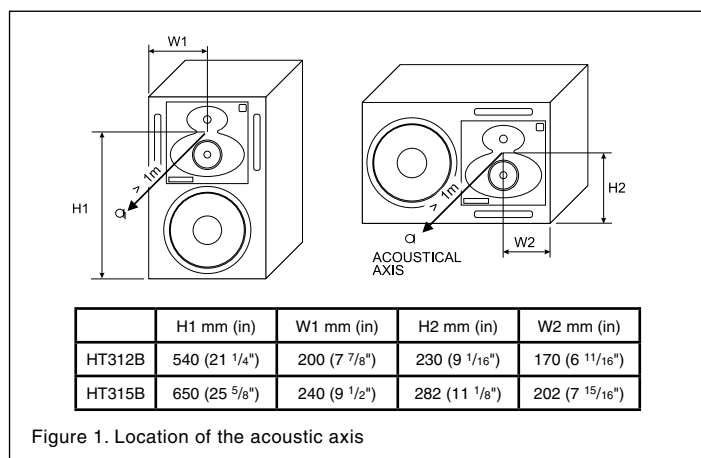


Figure 1. Location of the acoustic axis

@ 1m with -6 dBu input level. To get the full output level of 120 dB SPL from the HT315B an input level of +14 dBu is needed at this setting. Respectively, the full output level of the HT312B is reached at an input level of +10 dBu.

Autostart and remote control

The RAM4 and RAM5 amplifiers are equipped with an "Autostart" function, which automatically turns the amplifier to "standby" mode if an input signal has not been detected for approximately thirty minutes, and back to "on" mode when the signal returns. The function can be deactivated by turning the "AUTOSTART" dip switch on the amplifier back panel to "OFF".

The amplifier power can also be switched by a remote control unit connected to the respective inputs on the amplifier back panel. Two pairs of connectors are provided, 1 and 2 for a 12 V DC type remote control, and 3 and 4 for an external switch or relay type control. Do not connect two remote controls to the loudspeaker at the same time. Activate the function by turning the "REMOTE CONTROL" dip switch on the amplifier control panel to "ON". Note that the remote control function overrides the "autostart" dip switch function.

Setting the tone controls

The acoustic response of the system may also have to be adjusted to match the acoustic environment. The adjustment is done by setting the five tone control switch groups 'bass tilt', 'bass roll-off', 'bass level', 'mid level' and 'treble level' on the control panel of the amplifier. The manufacturer's default settings for these controls are 'All Off' to give a flat anechoic response. See Table 2 for suggested tone control settings in differing acoustic environments. Figures 7 and 8 show the effect of the controls on the anechoic response. Always start adjustment by setting all switches to the 'OFF' position. Then set only one switch per group to the 'ON' position to select the response curve required. If more than one switch is set to 'ON' (within one switch group) the attenuation value is no longer accurate.

Vertical / horizontal mounting

The loudspeakers are delivered either for vertical or horizontal mounting. In the horizontal mounting position the bass drivers should point inwards to obtain better low frequency coupling. If the loudspeaker positioning needs to be changed, the DCW plate can be rotated so that the midrange driver

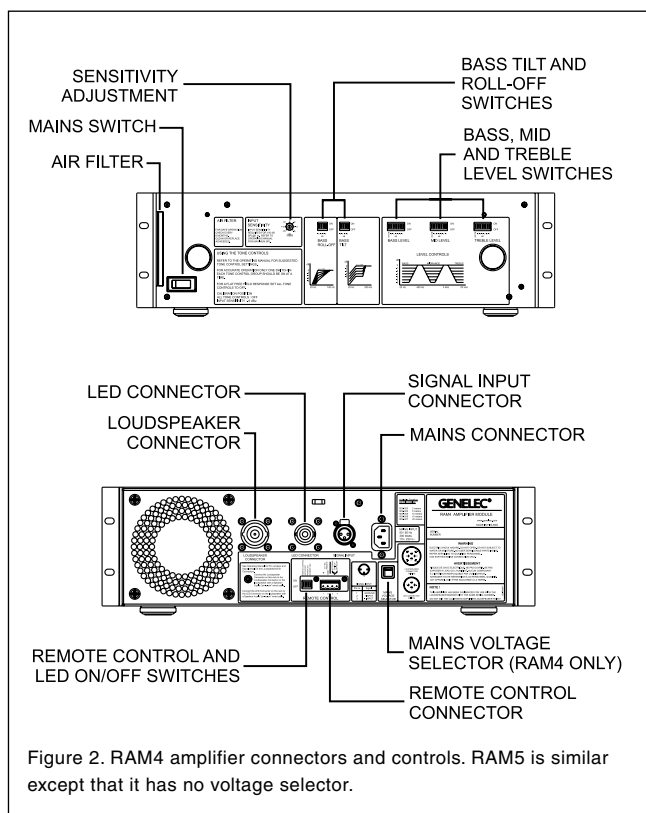


Figure 2. RAM4 amplifier connectors and controls. RAM5 is similar except that it has no voltage selector.

remains always located at the bottom of the DCW. Remove the four corner screws of the DCW and pull the plate carefully out without stressing the wires and the gasket. Rotate the plate 90 degrees in the appropriate direction and remount the screws.

Flush mounting

The HT312B and HT315B can be used flush mounted into the wall structure, which offers some acoustical benefits. No cabinet edge diffraction will occur, resulting in an improved response, especially at midrange frequencies. Low frequency reflections from the wall behind the loudspeaker can be avoided, which improves the low frequency response and efficiency and allows the loudspeaker to work in half space conditions. In terms of installation and orientation, the loudspeaker's acoustical axis (See Figure 1.) should also point directly to the reference listening position. The loudspeakers should be vertically aimed so that the acoustical axis of the loudspeakers meet around ear height at the reference listening position. In the horizontal plane the loudspeaker should be positioned according to the standard stereophonic (60 degrees between left-right channels) or multichannel (ITU-R BS.775-1) placement recommendation.

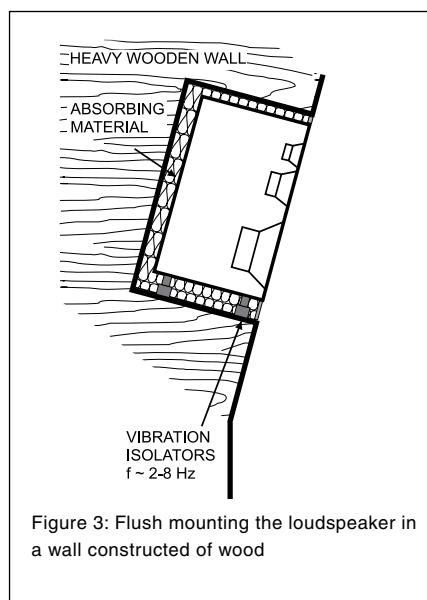


Figure 3: Flush mounting the loudspeaker in a wall constructed of wood

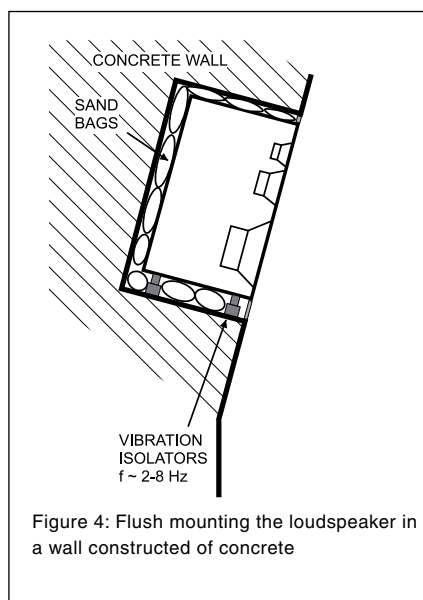


Figure 4: Flush mounting the loudspeaker in a wall constructed of concrete

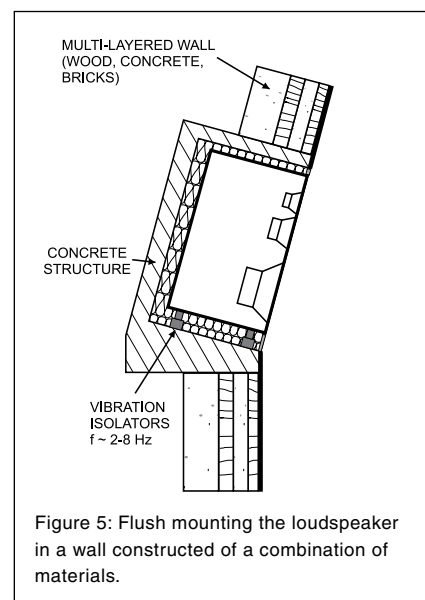


Figure 5: Flush mounting the loudspeaker in a wall constructed of a combination of materials.

The ceiling, side walls and especially the rear wall should be acoustically absorbent at low frequencies. The wall in which the loudspeakers are mounted should have a high acoustical mass to properly implement a low frequency radiation condition into half space and be angled so that the loudspeakers are correctly aimed. However, the loudspeakers should not be mounted too high as this increases the required vertical tilt of the loudspeaker (maximum tilt angle < 20 degrees) and reduces the optimum listening area. Great care should be taken over how the loudspeaker is mounted into the wall. Note the following:

A space 50 to 100 mm (2 to 4") wide can be left around the loudspeaker. Cover the space around the loudspeaker with a facing panel that should be fixed to the wall. Leave a gap of about 5 to 10 mm ($\frac{1}{4}$ to $\frac{1}{2}$ ") between the loudspeaker and the panel. Fill this gap with a soft rubber gasket to allow for possible cabinet movement (see Figure 6).

Regardless of the type of front wall construction the loudspeaker cabinet should be mounted on vibration isolators, with a resonant frequency between 2 to 8 Hz, to prevent vibrations from being transmitted to the wall and impairing the low frequency performance.

If a heavy wooden front wall construction is used, the space around the cabinet should be filled with absorbent mineral wool or foam plastic. The wooden wall structure must be heavily braced to achieve sufficiently high mass and rigidity (see Figure 3).

In a solid wall (e.g. concrete) structure, the space around the cabinet should be filled

with either absorbent mineral wool or sand bags (see Figure 4).

The wall can also be constructed of a combination of materials to achieve high acoustical structural mass that will disable low frequency sound propagation and provide high LF sound isolation (see Figure 5). Acoustic consultants will be able to provide details and design these structures.

Ensure that the cabinet is flush with the surface of the wall. Discontinuities in the loudspeaker mounting wall will cause diffraction, which leads to inferior frequency response and imaging. So, if a decorative cloth frame is used to cover the wall, make sure that the edges adjacent to the loudspeaker are less than 20 mm ($\frac{3}{4}$ ") deep. The cloth must be very thin Tricot or an acoustically transparent material otherwise the high frequency response of the system will be adversely affected. Genelec approved cloth grilles are available.

Mode indicator LED

The loudspeaker is provided with a three-colour indicator LED on the DCW™ panel. When the LED is green, it indicates that the loudspeaker is ready for use. Standby mode is indicated by yellow colour. Amplifier clipping is indicated by a blinking red light and thermal protection mode by a constant red light. If clipping is indicated reduce the signal level so that the LED stops blinking. If the red LED stays on constantly, switch off the loudspeaker and the audio source and let the amplifier cool down. Check that the ventilation around the amplifier is not blocked. There should be a

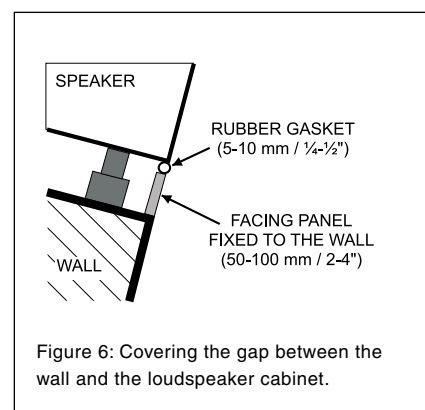


Figure 6: Covering the gap between the wall and the loudspeaker cabinet.

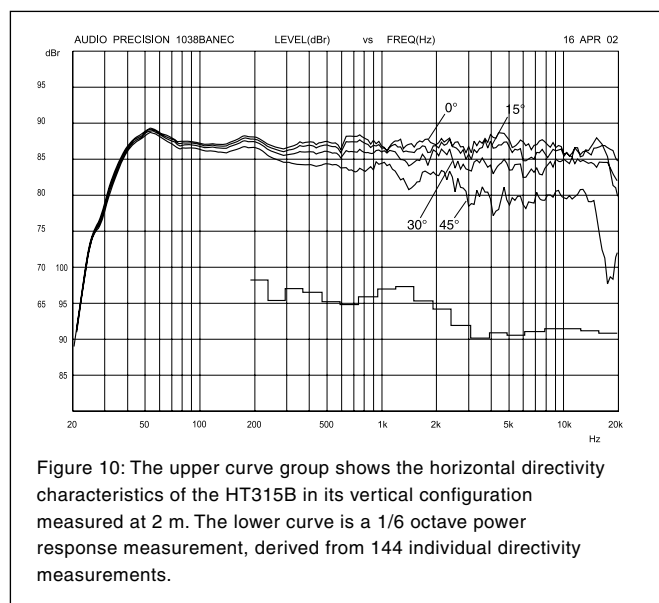
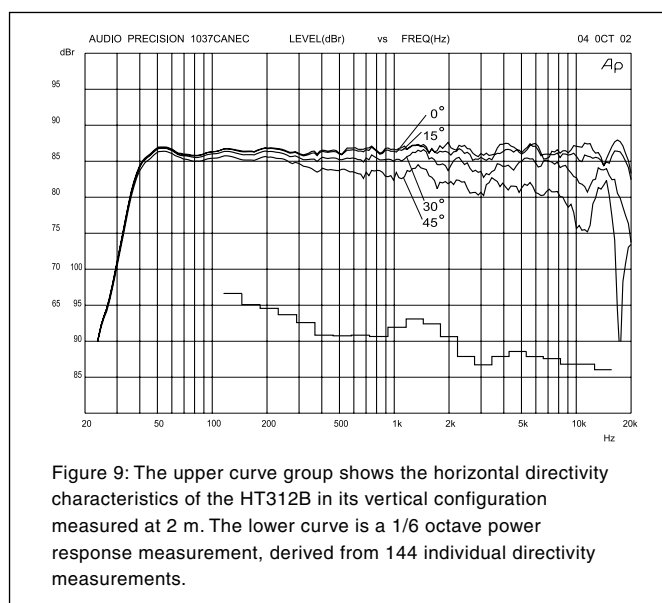
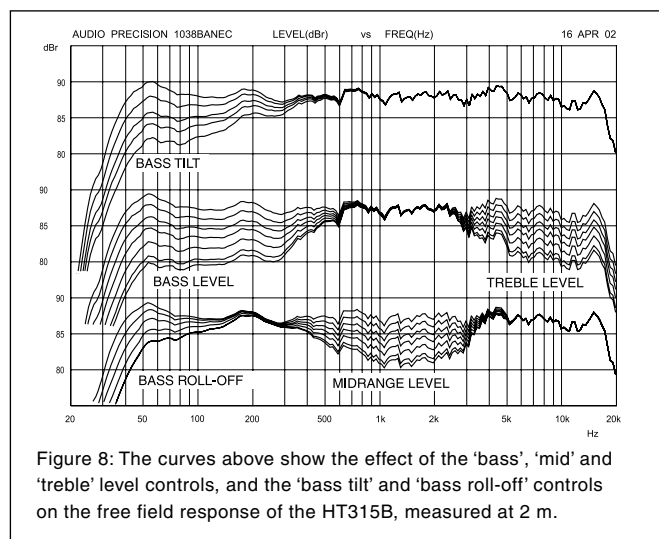
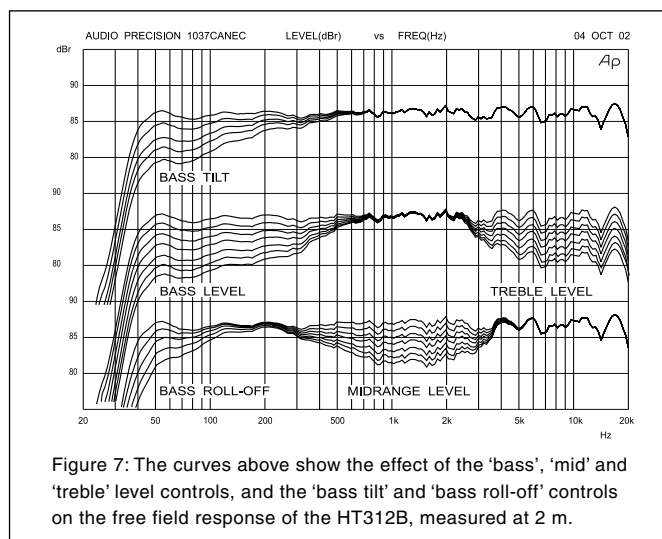
clearance of more than 100 mm (4") between the amplifier back panel and any solid surface at the back. If the red light does not come off, contact authorised Genelec service.

The LED can be deactivated if you find it disturbing in a darkened room by turning both the "POWER LED" and "STANDBY LED" switches on the amplifier panel to "OFF".

Maintenance

The air filter on the left side of the RAM4/5 amplifier must be cleaned every six months. Remove the decorative front plate and pull the filter out. Check the filter and replace it with a new one if any damage or brittleness can be found. If the filter is in a good condition, carefully clean it with compressed air.

No other serviceable parts are to be found within the loudspeaker enclosure or the amplifier unit. Any maintenance or repair should only be undertaken by qualified service personnel.



Safety considerations

Although the HT312B and HT315B loudspeakers have been designed in accordance with international safety standards, to ensure safe operation and to maintain the instrument under safe operating conditions, the warnings and cautions listed overleaf must be observed:

1. Servicing and adjustment must only be performed by qualified service personnel. The amplifier must not be opened.
2. Do not use the loudspeakers with an unearthed mains cable or unearthed mains connection as this may lead to personal injury.
3. These loudspeakers are capable of producing sound pressure levels in excess of 85 dB, which may cause permanent hearing damage.
4. Free flow of air around the amplifier is necessary to maintain sufficient cooling. Do not obstruct airflow around the amplifier.
5. To prevent fire or electric shock, do not expose the unit to water or moisture. Do not place any objects filled with liquid, such as vases on or near the loudspeaker or the amplifier.
6. Note that the amplifier is not completely disconnected from the AC mains service unless the mains cable is removed from the amplifier or the mains outlet.

Guarantee

These products are supplied with two year guarantee against manufacturing faults or defects that might alter their performance. Refer to supplier for full sales and guarantee terms.

HT312B and HT315B Operating Manual

SYSTEM SPECIFICATIONS		
	HT312B	HT315B
Lower cut-off frequency, -3 dB Upper cut-off frequency, -3 dB Free field frequency response of system	<35 Hz >22 kHz 37 Hz - 21 kHz (± 2.5 dB)	<33 Hz >20 kHz 35 Hz - 20 kHz (± 2.5 dB)
Maximum short term sine wave acoustic output on axis in half space, averaged from 100 Hz to 3 kHz	@ 1 m >116 dB SPL	@ 1 m >120 dB SPL
Maximum long term RMS acoustic output in same conditions with IEC-weighted noise (limited by driver unit protection circuit)	@ 1 m >107 dB SPL	@ 1 m >116 dB SPL
Maximum peak acoustic output per pair in half space with music material	@ 2 m >123 dB	@ 2 m >124 dB
Self generated noise level in free field @ 2 m on axis	<15 dB (A weighted)	
Harmonic distortion at 95 dB SPL at 1 m on axis:	freq. <100 Hz <1% freq. >100 Hz <0.5%	freq. 50...100 Hz <1% freq. >100 Hz <0.5%
Drivers Bass Midrange Treble All drivers are magnetically shielded	305 mm (12") cone 130 mm (5") cone 25 mm (1") metal dome	385 mm (15") cone 130 mm (5") cone 25 mm (1") metal dome
Weight	33 kg (73 lb)	52 kg (114 lb)
Dimensions Height Width Depth	680 mm (26 3/4") 400 mm (15 3/4") 380 mm (14 15/16")	810 mm (31 7/8") 480 mm (18 7/8") 420 mm (16 9/16")

CROSSOVER SECTION		
	HT312B	HT315B
Input connector XLR female	pin 1 gnd pin 2 + pin 3 -	
Input impedance	10 kOhm	
Input level for 100 dB SPL output @ 1 m	variable from +6 to -6 dBu	
Input level for maximum short term output	variable from +22 to +10 dBu for 116 dB SPL @ 1 m	variable from +26 to +14 dBu for 120 dB SPL @ 1 m
Subsonic filter	18 dB/octave below 35 Hz	18 dB/octave below 33 Hz
Ultrasonic filter	12 dB/octave above 25 kHz	
Crossover frequency Bass/Mid Mid/Treble	420 Hz 3.2 kHz	410 Hz 3 kHz
Crossover acoustical slopes	18 - 24 dB/octave	24 - 32 dB/octave
Crossover level control operating range in 1 dB steps Bass Mid Treble	from 0 to -6 dB from 0 to -6 dB from 0 to -6 dB	
Bass roll-off control in 2 dB steps	from 0 to -8 dB @35 Hz	from 0 to -8 dB @33 Hz
Bass tilt control in 2 dB steps	from 0 to -8 dB @80 Hz The 'CAL' position is with all tone controls set to 'off' and input sensitivity control to maximum.	

AMPLIFIER SECTION		
	RAM4 (HT312B)	RAM5 (HT315B)
Bass amplifier short term output power	180 W (4 Ohm load)	400 W (8 Ohm load)
Midrange amplifier short term output power with an 8 Ohm load	120 W	
Treble amplifier short term output power with an 8 Ohm load	120 W	
	Long term output power is limited by driver unit protection circuitry.	
Slew rate	80 V/ μ s	
Amplifier system distortion at nominal output THD SMPTE-IM CCIF-IM DIM 100	<0.05 % <0.05 % <0.05 % <0.05 %	
Signal to Noise ratio, referred to full output Bass Midrange Treble	>100 dB >100 dB >100 dB	
Mains voltage	100/200V or 115/230V selectable	100, 120, 220 or 230 V fixed according to region
Voltage operating range	nominal $\pm 10\%$	
Power consumption Idle Full output	50 W 300 W	60 W 500 W
Weight	12,3 kg (27 lb)	15 kg (33 lb)
Dimensions Height Width Depth	133 mm (5 1/4") (3 U) 483 mm (19") 350 mm (13 4/5")*	

*Note that the cable connectors require additional >100 mm (4") space behind the amplifier

EC Declaration of Conformity

This is to certify that the Genelec HT312B and HT315B Active 3-Way Speakers conform to the following standards:

Safety:
EN / IEC 60065:1998 6th Edition
EMC:
EN 55020 : 2002 + A1 : 2003
EN 55013: (2001)
EN 61000-3-2 (2000)
EN 61000-3-3 (1995)

The product herewith complies with the requirements of The Low Voltage Directive 73/23/EEC, EMC Directive 89/336/EEC and 93/68/EEC

Signed: 
Ilpo Martikainen
Chairman of the Board
Date: 12-May-2008

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