

GENELEC®

Genelec 2029B Digital
Monitoring System

Operating
Manual



1. General description

Genelec 2029B Digital Monitoring System has a 96 kHz/24 bit digital audio interface allowing you to input the digital audio straight into the loudspeaker. This has several significant advantages. When you are working with a digital audio workstation or you are processing audio in a modern studio, your signal is digital. The 2029B allows you to listen to what you have in your digital format.

The 2029B supports all the same modes of operation as the analog Genelec 1029A. You can use it with a subwoofer. You can use it in surround audio systems. You can even use the 2029B as an analog speaker.

Due to its compact size, integrated construction, excellent dispersion and precise stereo imaging, this speaker system is ideal for near field monitoring, mobile vans, digital audio workstations, broadcast and TV control rooms, surround sound systems, home studios, multimedia applications and also computer soundcards. As an active speaker this unit contains all you need: drivers, power amplifiers, active crossover filters and protection circuitry. The Directivity Control Waveguide (DCW™) technology provides excellent frequency balance even in difficult acoustic environments.

2. Digital audio

The quality of a digital audio signal is defined by the two parameters: word length and sampling rate.

The word length defines how precisely the audio signal is represented. Longer word length leads to smaller noise and distortion level. The typical word length in CD records is 16 bits. Studio recording systems use word lengths of 20 bits and above.

The sampling rate determines what frequencies can be represented in the

digital audio signal. A higher sampling rate allows higher frequencies to be recorded. Studio recording systems use sampling rates of 44.1 kHz and above.

Turning the digital presentation to an analog signal using a D/A converter involves potential sources of error. The digital-to-analog converter may have inferior performance or it may be misaligned with your amplifiers. The interface between the converter and the amplifier may distort the signal or change the frequency balance. The monitoring volume level may need to be adjusted in the digital domain instead of analog. Genelec 2029B allows you to solve all of these problems. The alignment of the whole system is carefully balanced, to make sure that you hear the whole digital truth, and nothing but the truth. All you have to do is to supply the digital signal and adjust for the volume you desire.

3. Integrated construction

As the digital interface and amplifiers are built into the speaker enclosure, the only connections required are the mains supply and the digital input signal, making the 2029B very easy to set up and use.

Digital interface

The digital audio interface comprises a digital audio receiver and a digital-to-analog converter (D/A converter). The digital input accepts an AES/EBU digital audio signal having a word length up to 24 bits and sampling rate up to 100 kHz. The D/A converter has high resilience to clock jitter and excellent linearity.

Drivers

The bass frequencies are reproduced by a 130 mm (5") bass driver mounted in a 4.5 litre vented cabinet. The -3 dB point lies at 68 Hz and the frequency response extends down to 65Hz (-6 dB).

The high frequency driver is a 19 mm (3/4") metal dome. Uniform dispersion is achieved with the revolutionary DCW™ Technology pioneered by Genelec.

Magnetic shielding is standard on Genelec 2029B. Shielding is vital for applications such as video post production, where stray magnetic fields must be minimized.

Crossover

The active crossover network is acoustically complementary and the slopes are 24 - 32 dB/octave. The crossover frequency is 3.3 kHz. The room response controls ('treble tilt', 'bass tilt' and 'bass roll-off') allow perfect reproduction in any room installation.

Amplifiers

The amplifier unit is built inside the speaker enclosure. The bass and treble amplifiers both produce 40 W of output power. The fast, low distortion amplifiers are capable of driving a stereo pair to peak output sound pressure levels in excess of 110 dB at 1 m. The unit incorporates special circuitry for driver overload protection.

4. Installation

Contents of Genelec 2029B delivery package

1. Two loudspeakers
2. Two mains cables.
3. One interconnect cable, with male XLR connectors on both ends.
4. A user's manual

After unpacking, check that the mains voltage selector (see figure 2) is correctly set and place the loudspeakers at their listening position, taking note of the listening axis (see figure 1). Note that the speakers are designated as "Right" and "Left" (see the stickers on the speaker's backpanels). The "Right" speaker, which contains the digital interface also has a

grey volume control knob for easy identification. Ensure that the mains switches are off and the volume controls turned fully counterclockwise.

How to set up for digital signals

Connect the special interconnect cable between the "ANALOG INPUT 1" XLR connectors of the two 2029B monitors.

Connect a digital audio interface cable to your digital audio source. You can identify the right connector on your audio source by looking for the words "Digital Output" or "AES/EBU". Before you use one you should make absolutely sure that the connector is carrying the AES/EBU formatted digital audio signal.

One of the 2029B units ("Right") has a matching digital input XLR connector in the back of the unit. Locate the connector ("DIGITAL INPUT 3", see figure 2) and notice the signal indicator LED in the front. Connect the digital signal cable and switch on the power on both speakers. The LED on the "Right" 2029B should change colour from green to yellow. **DO NOT** connect an analog signal cable to the digital input connector!

Turn the volume control at the "Left" speaker to maximum value. This calibrates the balance between the speakers. Adjust the desired output level at the "Right" speaker's (the one receiving the digital audio) volume

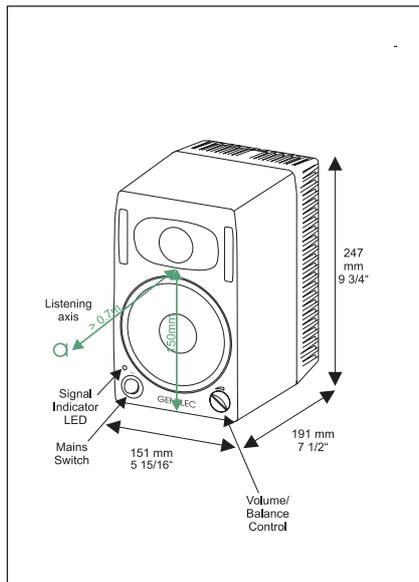


Figure 1: 2029B outer dimensions, with the reference axis between the bass and the treble drivers.

control. Note that the output level adjustment scales the maximum sound pressure level produced by the digital audio signal. Left to Right balance is somewhat inaccurate in the minimum 10% travel of the volume setting.

To help you solve any problems, here are a few pointers:

- Make sure that your audio signal source has been set to transmit the audio to the AES/EBU output.
- Make sure the digital interface cable is specified for use with AES/EBU digital audio signals and properly connected at both ends.
- Make sure the LED turns yellow as you plug in the digital audio cable to the 2029B unit. If this is not the case, go back to your audio source and check once more that the right output is selected. If the LED stays green you do not have a valid digital audio carrier on the cable.
- If you see the LED flashing red colour, check your cabling. Red colour indicates a bit error in transmission.

How to set up for analog signals

Turn all mains switches off and remove the digital audio cable at the "Right" 2029B. Remove the interconnect cable between the speakers. Run normal XLR cables from your line level analog audio source to the "ANALOG INPUT 1" XLR connectors on both 2029B units. If a Genelec 1091A subwoofer is not used, an another signal source can be connected to "ANALOG INPUT 2" 1/4" Jack connectors. Switch on the power on both speakers. Observe that the LEDs should turn green. The output levels can be adjusted at the front of both 2029B units independently for left and right channels.

How to set up Genelec 1091A subwoofer

A standard Genelec 1091A subwoofer package contains cables to connect to both 2029B units. The cables have 1/4" (6mm) plugs that connect to the "ANALOG INPUT 2 & SUBWOOFER OUTPUT" connectors on the 2029B units (see figure 5). On each 2029B, flip the tone control switch number 2 to "ON" position to change the bass roll-off frequency to 85 Hz. This is the right setting when the subwoofer 1091A is used.

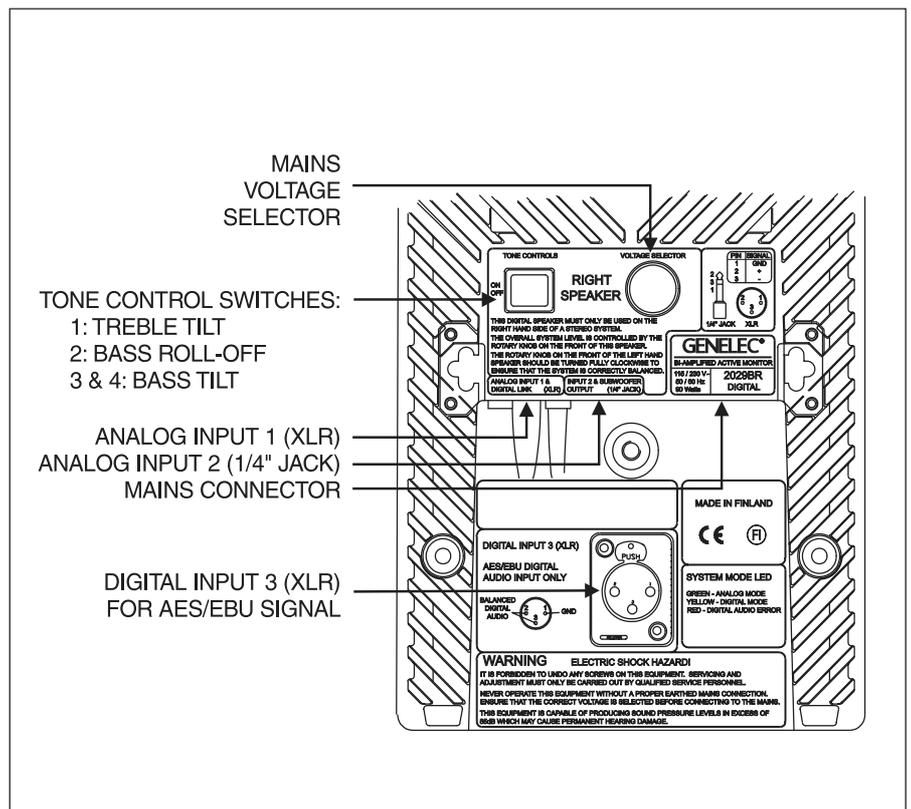


Figure 2: 2029B Right speaker backpanel

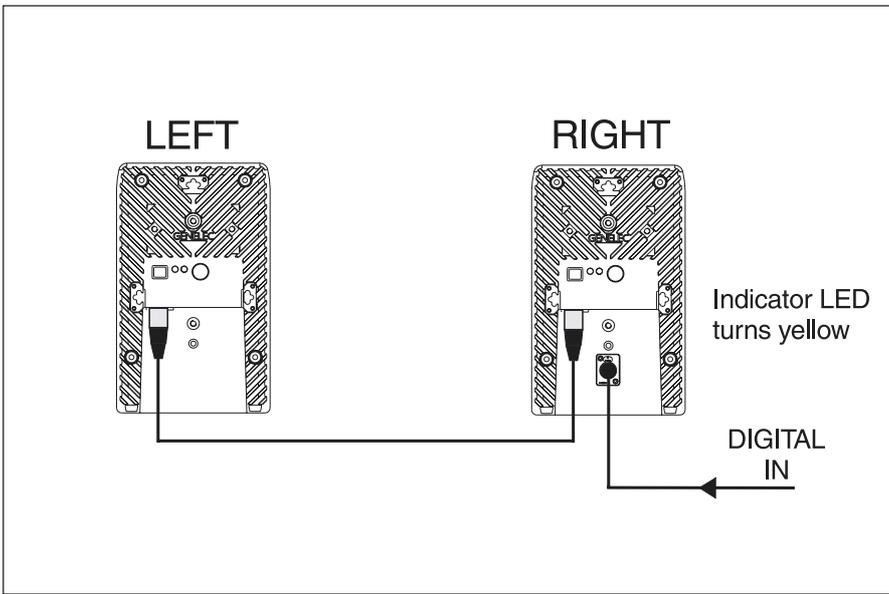


Figure 3. Cabling scheme for digital setup

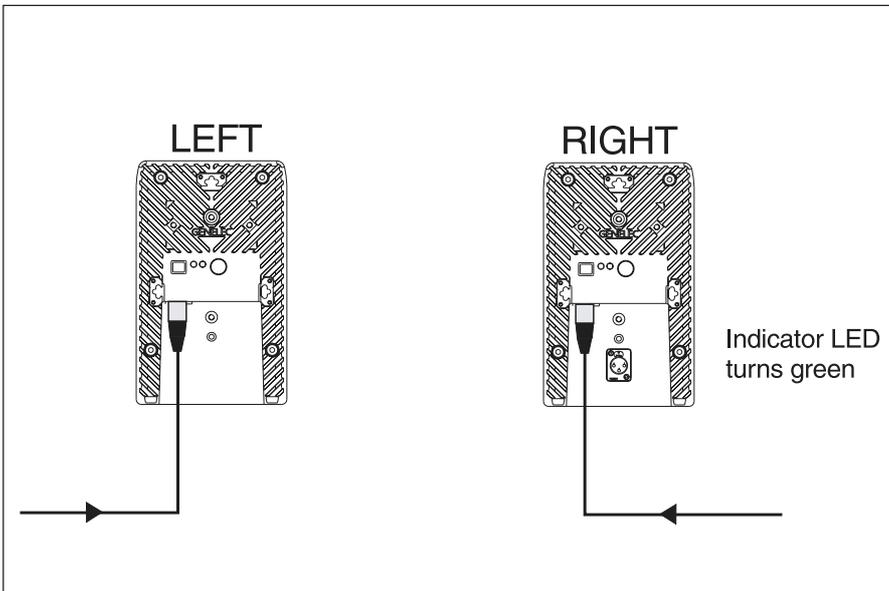


Figure 4. Cabling scheme for analog setup

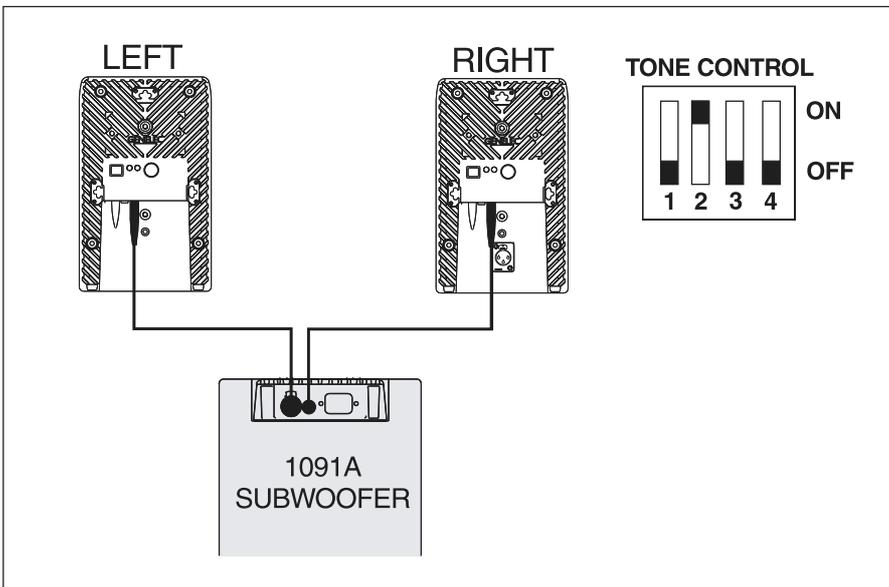


Figure 5. Cabling and 2029B tone control settings when using subwoofer 1091A.

Setting tone controls

The response of the system may have to be adjusted to match the acoustic environment. The adjustment is done by setting the tone control switches on the rear panel. The tone control has four switches and can adjust 'treble tilt', 'bass tilt' and 'bass roll-off.' The factory settings for these are 'ALL OFF' to give a flat anechoic response. See Figure 6 for suggested tone control settings in differing acoustic environments. Figure 9 shows the effect of the controls on the anechoic response. Always start adjustment by setting all switches to 'OFF' position. Then set a switch to 'ON' position to select the necessary response curve.

5. Monitor placement.

Console top mounting

Avoid mounting Genelec 2029B monitors directly on the console top. Instead, position the speakers slightly behind the console by using floor stands, wall mounts or microphone stands. This minimizes sound colouring reflections from the console surface.

Placement in a room

To produce a true and accurate stereo image the monitors must have exactly similar frequency responses. When placed in a room monitor responses change due to reflections of the sound waves from the room's boundaries. It is necessary to place the monitors at the same height and also at the same distance from the front and side walls so that reflections, and therefore changes to the frequency response, are similar.

To avoid differences in frequency responses due to reflections from the front wall, the monitors should be placed either nearer than 1m or further than 3m from the front wall. Placement close to the front wall (<1m) will boost low frequencies, and the tone controls should be adjusted appropriately (see figure 6).

The monitors should be aimed toward the listening position. This maximizes the ratio of direct sound to reflected sound and the listener is able to hear more of the material and less of the

Speaker Mounting Position	Treble Tilt (Switch 1)	Bass Tilt (Switches 3 & 4)	Bass Roll-Off (Switch 2)
Flat Anechoic Response	OFF	OFF	OFF
Free standing in a damped room	OFF	OFF	OFF
Free standing in a reverberant room	OFF	-2dB (Switch 3 ON, switch 4 OFF)	OFF
Near field on a console bridge	OFF	-4dB (Switch 4 ON, switch 3 OFF)	OFF
Near to a wall	OFF	-6 dB (Switches 3 and 4 ON)	OFF
With the 1091A subwoofer	See above settings	See above settings	ON

Figure 6. Suggested tone control settings for various acoustic environments

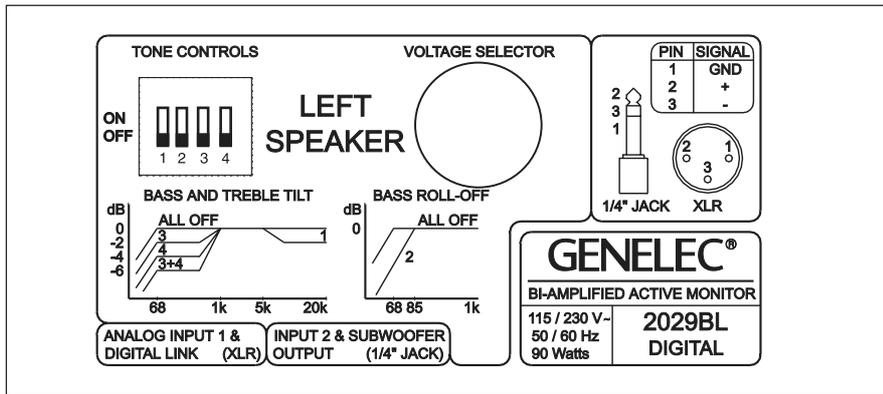


Figure 7. Tone control switches on the back panel of 2029B "Left". Note that the digital audio receiving speaker ("Right") has different labelling.

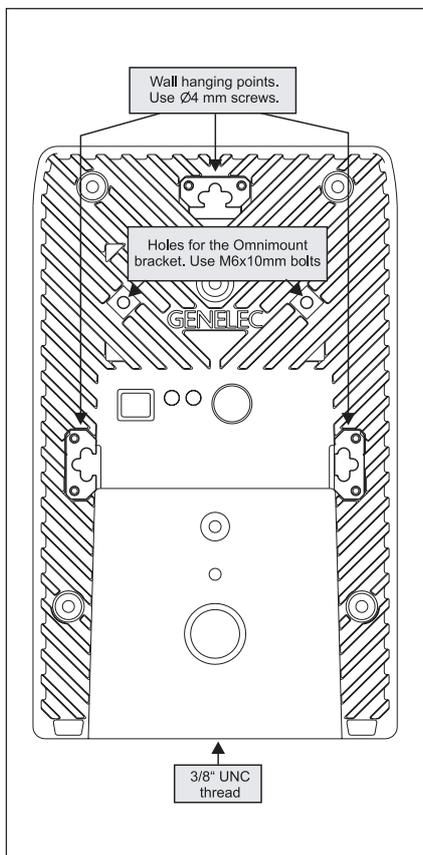


Figure 8. Mounting options of the 2029B

room effects. Subjectively this is perceived as cleaner sound and superior stereo imaging.

Mounting options

Figure 8 shows the three possibilities for mounting the 2029B. On the base of the monitor is a $\frac{3}{8}$ " UNC threaded hole which can accommodate a standard microphone stand. On the rear there is a provision for an Omnimount®, size 50, bracket, the hardware required is 2 of M6x10mm screws. Alternatively, the speaker can be hung on a wall in a vertical or horizontal position by one of the three wall hanging points. For this, 4 mm diameter screws with suitable size heads are needed. Eight friction pads are also provided for placing the 2029B on flat surfaces. The larger pads can be used on the base of a vertically mounted 2029B, and the smaller pads on the side for horizontal mounting. There are recesses where the pads can be stuck. If necessary, the pads can also be used for tilting the speaker slightly.

6. Maintenance

There are no user serviceable parts in the unit. Maintenance or repair of the 2029B units should be done by qualified service personnel only.

7. Safety considerations

Genelec 2029B has been designed in accordance with international safety standards. To ensure safe operation and to maintain the instrument in safe operating condition, the following warnings and cautions must be observed:

- Servicing and adjustment should only be performed by qualified service personnel.
- Do not use this product with an unearthed mains cable as this may compromise electrical safety.
- This equipment is capable of producing sound pressure levels in excess of 85 dB, which may cause permanent hearing damage.
- Free flow of air behind the loudspeaker is necessary to maintain sufficient cooling. Do not obstruct airflow around the loudspeakers.
- Do not insert any objects through the bass reflex ports on the face of the unit, as this may damage the electronics inside the loudspeaker.
- Do not run an analog audio signal to the digital input XLR connector. Doing so may overload your audio equipment output and cause them permanent damage.

8. Guarantee

This product is guaranteed for a period of ONE year against faults in materials or workmanship. Refer to supplier for full sales and guarantee terms.

GENELEC®

ACTIVE MONITORING

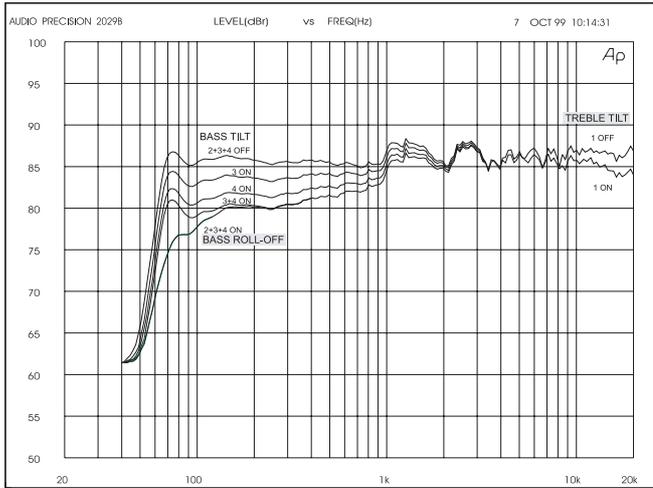


Figure 9: The effect of 'treble tilt', 'bass tilt' and 'bass roll-off' controls in free field.

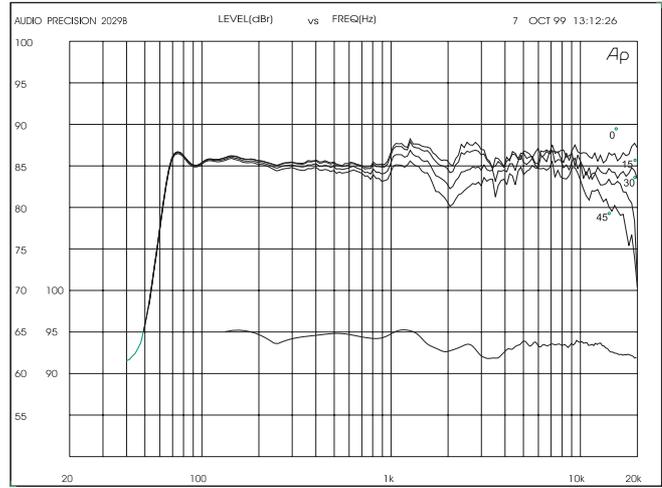


Figure 10: Horizontal directivity characteristics and power response of 2029B in its vertical configuration measured at 1m in free field.

SYSTEM SPECIFICATIONS

Lower cut-off frequency, -3 dB:	≤ 68 Hz
Upper cut-off frequency, -3 dB:	≥ 20 kHz
Free field frequency response of system:	70 Hz - 18 kHz (± 2.5 dB)
Maximum short term sine wave acoustic output on axis in half space, averaged from 100 Hz to 3 kHz:	@ 1m ≥ 100 dB SPL @ 0.5m ≥ 106 dB SPL
Maximum long term RMS acoustic output in same conditions with IEC weighted noise (limited by driver unit protection circuit):	@ 1m ≥ 98 dB SPL @ 0.5m ≥ 104 dB SPL
Maximum peak acoustic output per pair on top of console, @ 1 m from the engineer with music material:	≥ 110 dB
Self generated noise level in free field @ 1m on axis:	≤ 10 dB (A-weighted)
Harmonic distortion at 85 dB SPL @ 1m on axis:	Freq: 75...150 Hz < 3% > 150 Hz < 1%
Drivers:	Bass 130 mm (5") cone Treble 19 mm (3/4") metal dome Both drivers are magnetically shielded.
Weight:	5.7 kg (12.5 lb)
Dimensions:	Height 247 mm (9 3/4") Width 151 mm (5 15/16") Depth 191 mm (7 1/2")

CROSSOVER SECTION

Analog inputs:
Input 1: XLR female, balanced 10kOhm
Input 2: 1/4" Jacksocket, balanced 10kOhm

Volume control:
Variable from Mute to -6 dBu for 100 dB SPL output @ 1m

Subsonic filter below 68 Hz :
18 dB/octave

1091A Subwoofer output (input 2) at 100dB SPL:
-23 dBu into 33kOhm load

Ultrasonic filter above 25 kHz:
12 dB/octave

Crossover frequency, Bass/Treble:
3.3 kHz

Crossover acoustical slopes:
24 - 32 dB/octave

Treble tilt control operating range:
0 to -2 dB @ 15 kHz

Bass roll-off control operating in a -6 dB step @ 85 Hz (to be used in conjunction with the 1091A subwoofer)

Bass tilt control operating range in -2 dB steps:
0 to -6 dB @ 150 Hz

The 'CAL' position is with all tone controls set to 'off' and the input sensitivity control to maximum (fully clockwise).

DIGITAL SECTION

Digital input 3: XLR female
Maximum word length: 24 bits

Input format: AES/EBU, SP-DIF*

Input termination impedance: 110 ohms

Input sampling rate: 29-100 kHz (no de-emphasis)
44.1 kHz (using de-emphasis)

Jitter resilience: 0.15 unit intervals

Dynamic range: >113 dB (A weighted, triangular PDF dither, 24 bit data)

De-emphasis: 50/15us, automatic

Recovered clock jitter: 200 picoseconds RMS typical

* An optional impedance matching adapter is required for SP-DIF formatted signal input.

AMPLIFIER SECTION

Bass amplifier output power with an 8 Ohm load: 40 W

Treble amplifier output power with an 8 Ohm load: 40 W

Long term output power is limited by driver unit protection circuitry.

Amplifier system distortion at nominal output:

THD	≤ 0.08%
SMPTE-IM	≤ 0.08%
CCIF-IM	≤ 0.08%
DIM 100	≤ 0.08%

Signal to Noise ratio, referred to full output:

Bass	≥ 90 dB
Treble	≥ 90 dB

Mains voltage: 100/200 or 115/230 V

Voltage operating range: ±10%

Power consumption: Idle 9 VA
Full output 90 VA

GENELEC®



Genelec Oy, Olvitie 5
FIN - 74100 IISALMI, FINLAND
Phone: +358 - 17 - 83881
Telefax: +358 - 17 - 812267
Web: http://www.genelec.com
E-mail: genelec@genelec.com

Genelec Inc, 7 Tech Circle
Natick, MA 01760, USA
Phone: +1 - 508 - 652 - 0900
Fax: +1 - 508 - 652 - 0909
E-mail: genelec@compuserve.com

Genelec document DR2029B001
COPYRIGHT GENELEC OY 1.2000
All data subject to change without prior notice