

dBQ-zero

User Manual





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dBQ-zero

2 x 30-band graphic equaliser

June 2010

Serial number of this product:

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Important safety instructions

CAUTION: to reduce the risk of electric shock, do not remove cover (or back). No user-serviceable parts inside. Refer servicing to qualified service personnel.



The lightning flash with arrowhead symbol, within equilateral triangle, is intended to alert the user to the presence of uninsulated “dangerous voltage” within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

Instructions

Before installing or operating the equipment, read all safety instructions, warnings and operating instructions. Heed all warnings. Follow all instructions. Keep all safety, installing and operating instructions for future reference.

Installing and operating location

Do not use this apparatus near water. Do not expose this apparatus to drips or splashes. Do not place any objects filled with liquids, such as vases, on the apparatus.

Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat. No naked flames, such as lighted candles, should be placed on the apparatus.

Do not install the apparatus in a confined space such as a book case or similar unit. Do not block any ventilation openings.

Ensure that foreign objects and liquids cannot get into the equipment.

Install in accordance with the manufacturer’s instructions. Only use attachments/accessories specified by the manufacturer.

Use only with the cart, stand, tripod, bracket or table specified by the manufacturer, or sold with the apparatus.



When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip over.

The apparatus should be located close enough to the AC outlet so that you can easily grasp the power cord plug at any time.

The mains plug, the appliance coupler or the mains switch is used as the disconnect device. Either device shall remain readily operable when the apparatus is installed or used.

Power source and grounding

This product should be operated only from the power source indicated on the apparatus or in the operating instructions. If you are not sure of the type of power supply to your home, consult your product dealer or local power company.

Do not defeat the safety purpose of the polarised or grounding-type plug. A polarised plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

Connect Class I construction apparatus to an AC outlet with a protective grounding connection.

Do not overload wall outlets, extension cords or integral convenience receptacles, as this can result in a risk of fire or electric shock.

Protect the power cord from being walked on or pinched, particularly at plugs, convenience receptacles and the point where they exit from the apparatus.

Unplug this apparatus during lightning storms or when unused for long periods of time.

Batteries (battery pack or batteries installed) should not be exposed to excessive heat such as sunshine, fire or the like. Never dispose of batteries in a fire as they may explode and cause injury.

CAUTION: Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type.

Cleaning, maintenance and servicing

Unplug the apparatus from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.

Do not attempt to service this product yourself, as opening or removing covers may expose you to dangerous voltage or other hazards. Refer all servicing to qualified service personnel.

Service is required when the apparatus has been damaged in any way, such as power-supply cord or plug damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally or has been dropped.

Intended use

The equipment may only be used for the purpose described in the operation instructions. Never carry out any work on the equipment other than as specified in the operating manual.

Never push objects of any kind into this product through openings, as they may touch dangerous voltage points or short-cut parts, which could result in a fire or electric shock.

Children should never use the apparatus without close adult supervision.

WARNING: excessive sound pressure levels can cause hearing loss.

Environmental precaution

Electrical and electronic equipment may contain hazardous substances for humans and their environment.



The “crossed out wheellie bin” symbol present on the device and represented above is there to remind one of the obligation of selective collection of waste. This label is applied to various products to indicate that the product is not to be thrown away as unsorted municipal waste. At the end of life, dispose of this product by returning it to the point of sale or to your local municipal collection point for recycling of electric and electronic devices.

Customer participation is important to minimize the potential effects on the environment and human health that can result from hazardous substances that may be contained in this product.



Please, dispose of this product and its packaging in accordance with local and national disposal regulations including those governing the recovery and recycling of waste electrical and electronic equipment. Contact your local waste administration, waste collection company or dealer.

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Register your product

Please take the time to register your product on-line by typing the following URL in your browser:

<http://productregistration.apex-audio.eu/>

As well as registering the product on-line, please take the trouble to record the serial number of the unit in the space provided on page 3 of the manual, and keep the manual in a safe place.

Dear customer,

Thank you for buying the Apex dBQ-zero. The dBQ-zero is a no-compromise 2-channel graphic equaliser with supplementary filter sections. It is an excellent choice for live or installed sound reinforcement applications. A typical application of the dBQ-zero would be to equalise monitor wedges.

As well as registering the product on-line, please take the trouble to record the serial number of the unit in the space provided on the front cover of the manual, and keep the manual in a safe place.

Product highlights

- Constant-Q design for an accurate graphic representation
- Selectable boost/cut scale ± 6 dB or ± 15 dB
- 45 mm precision faders
- Equaliser bypass switch and automatic bypass in the event of power failure
- Swept high-pass filters for removing unwanted low frequency content
- Precise and deep notch filters for accurate feedback suppression
- High and low shelving filters for smooth frequency adjustment
- Clear 10-segment level indicator with dedicated signal present and clip LEDs
- Electronically balanced inputs
- High-quality, servo-balanced output stages, capable of driving long cables

Foreword

On both equaliser channels, the 30-band Constant-Q graphic EQ is complemented with a filter section consisting of a high-pass filter, high and low shelving equalisers and two notch filters. Shelving filters add 'warmth' and 'colour' to the mix.

A typical application for the frequency adjustable high-pass filter is to remove hum or vibration transmitted by turntables. Notch filters provide a quick and simple method of removing noise or potential feedback frequencies.

The Constant-Q design preserves filter bandwidth independently from amplitude and therefore minimises adjacent band-interaction. The use of Constant-Q filters also ensures that the composite filter response of the graphic EQ accurately follows the physical positions of the front panel faders.

Front panel legending and controls are clear and straightforward. Two 10-segment LED level indicators, each with dedicated signal present and clip LEDs are available.

For convenience and to simplify installation in any application, the dBQ-zero comes with balanced inputs and outputs on XLR, 6.35 mm jack and screw terminal connections.

About this manual

Carefully read all instructions and warnings before operating this appliance. Keep this manual in a safe place so that it can be referred to when required.

Latest manual revision can be downloaded from:
<http://www.apex-audio.be/manufacturing/support/downloads/>

Inspection and unpacking

This appliance has been carefully packed in the factory and the packaging was designed to withstand rough handling. Should the unit appear to have been damaged in transit, do not discard any of the packing material and notify the carrier immediately as they would be responsible.

Save all the packing materials for future use if you ever need to ship the unit again.

Please check the list below against the contents of the packaging. If any items are missing or damaged, contact the Apex dealer or distributor where you purchased the unit.

- dBQ-zero unit
- IEC AC power cable with mains plug
- This manual

Operating environment

This appliance is designed to operate in moderate climates at a temperature between 5 and 40°C (41 - 104°F) with relative humidity no more than 60 %.

Should the unit be installed in an equipment rack, it is important to ensure that the operating temperature inside the rack does not exceed the upper limit. This could be the case where the rack contains power amplifiers. A cooling fan may be necessary in such installations.

Power requirements

BEFORE you connect any unit to the mains, please make sure that your local AC supply is within the range of voltages required by the unit.

The dBQ-zero is designed to work from an AC supply between 100 V and 240 V, at a frequency between 50 and 60Hz. No AC voltage selector is provided as the device automatically adjusts to the incoming AC voltage.

Precautions should be taken so that the appliance is properly grounded at all times. **This unit must be earthed.**

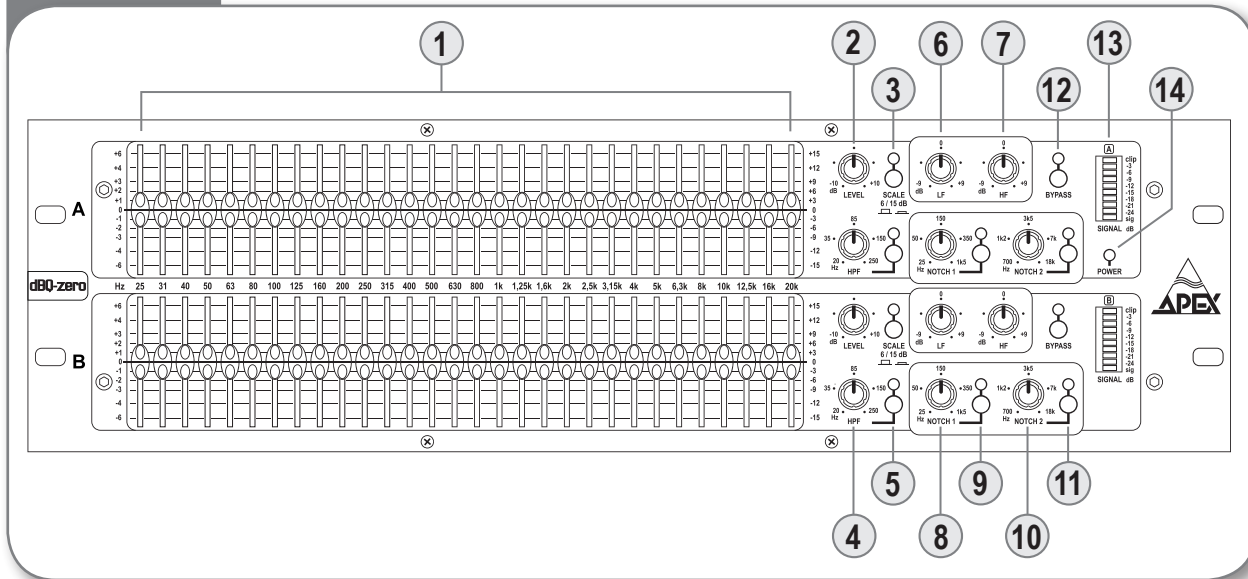
Installation

If the unit is brought into a warm room from a cold environment, internal condensation may occur. Wait an hour or two before switching it on so that it can reach the ambient temperature.

Although this unit is intended for installation in a standard 19-inch rack it can nevertheless be used freestanding. If the unit is installed in a flight-case or in an equipment rack, fix the unit with all four screws through the front panel holes. For normal use no extra support is needed, but in more extreme conditions, such as on the road, we recommend the unit is supported at the rear.

Allow at least 10 cm (4 inches) at the back, front and sides of the unit for sufficient ventilation.

Front panel



Front panel

Input Controls:

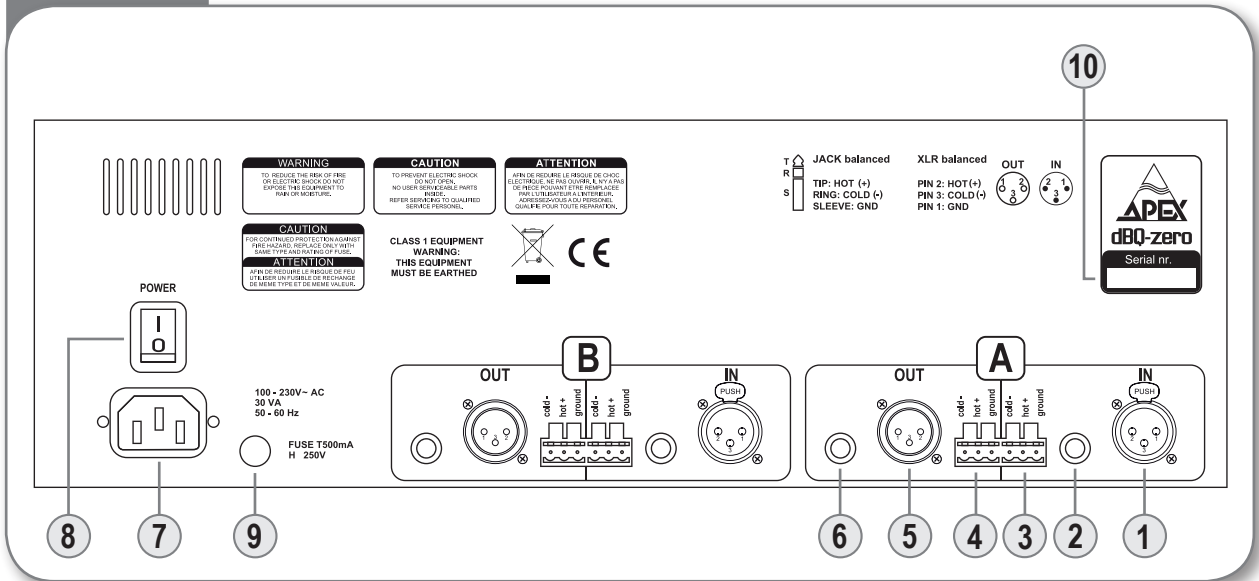
Front panel controls for channel **A** and channel **B** are identical.

- ① 30-band graphic equaliser section; centre frequencies follow the ISO standard.
- ② Input **level** control with range from -10 to +10 dB. The control is centre-detented at unity gain (0 dB).
- ③ **6/15 dB scale** switch changes the maximum boost/attenuation of the graphic EQ. The green LED indicates that the ± 15 dB range is active.
- ④ High-pass filter frequency selection control.
- ⑤ High-pass filter on/off switch. The green LED indicates the filter is active.
- ⑥ Low-shelving filter gain.
- ⑦ High-shelving filter gain.
- ⑧ Low frequency notch filter frequency selection.
- ⑨ Low frequency notch filter on/off switch. The green LED indicates the filter is active.
- ⑩ High frequency notch filter frequency selection.
- ⑪ High frequency notch filter on/off switch. The green LED indicates the filter is active.
- ⑫ Bypass switch; disables input level, graphic EQ and all other filters in the channel. The green LED indicates that level and filters are bypassed.
- ⑬ LED peak meter with separate signal present and clip LEDs. The clip LED indicates that the signal level is within 1 dB of clipping.

Other front panel features:

- ⑭ The green **Power** LED illuminates when AC power is applied to the unit. The dBQ-zero's power switch is on the unit's rear panel.

Rear panel



Rear panel

Rear panel connections for channel A are described; those for channel B are identical.

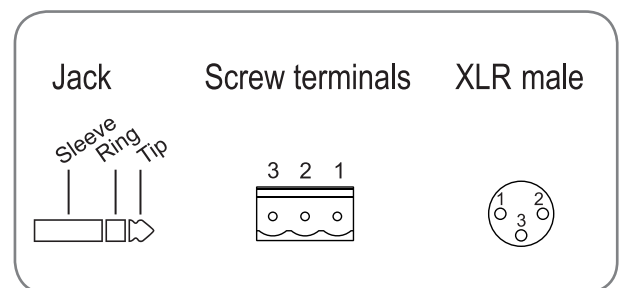
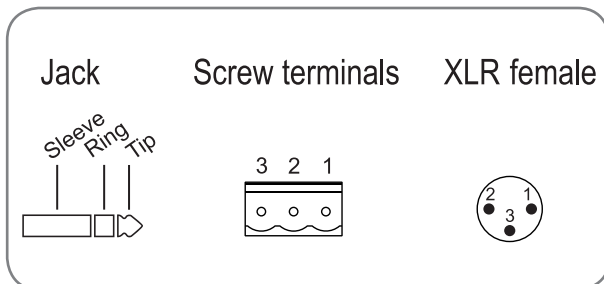
- ① Channel A balanced input - female XLR
- ② Channel A balanced input - 6.35 mm TRS jack
- ③ Channel A balanced input - screw terminal

Input connector pinouts are as follows:

Signal	XLR (female)	TRS jack	Screw terminal (from right to left)
GND	1	Sleeve	1
'Hot' (+)	2	Tip	2
'Cold' (-)	3	Ring	3

Output connector pinouts are as follows:

Signal	XLR (male)	TRS jack	Screw terminal (from right to left)
GND	1	Sleeve	1
'Hot' (+)	2	Tip	2
'Cold' (-)	3	Ring	3



- ④ Channel A balanced output - screw terminal
- ⑤ Channel A balanced output - male XLR
- ⑥ Channel A balanced output - 6.35 mm TRS jack

- ⑦ IEC receptacle for AC mains.
- ⑧ A 'POWER' switch of the 'rocker' type applies power to the unit.
- ⑨ Mains fuse holder. The fuse size is 20 x 5 mm, type T500mA (slo-blo). Only replace a fuse with one of an identical size, type and rating.
- ⑩ The unit's serial number can be found on the rear of the unit. Please record this number in the space provided on the first page of this manual.

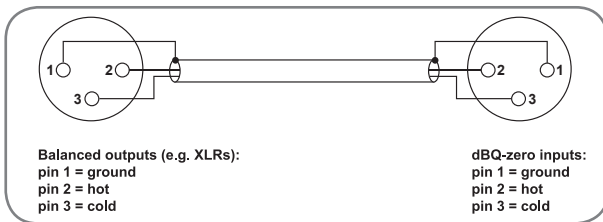
Wiring the unit

The use of twin-and-screen cable is recommended for both inputs and outputs.

Inputs

Preferred wiring for both balanced and unbalanced sources is illustrated below:

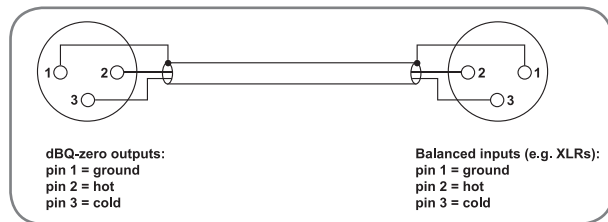
Balanced



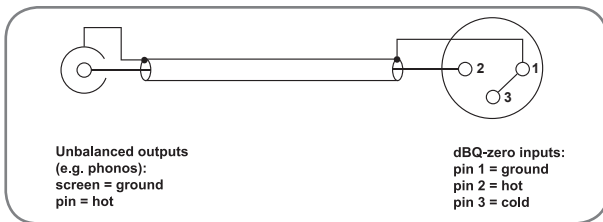
Outputs

Preferred wiring for both balanced and unbalanced destinations is illustrated below:

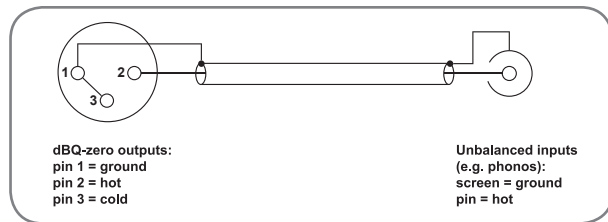
Balanced



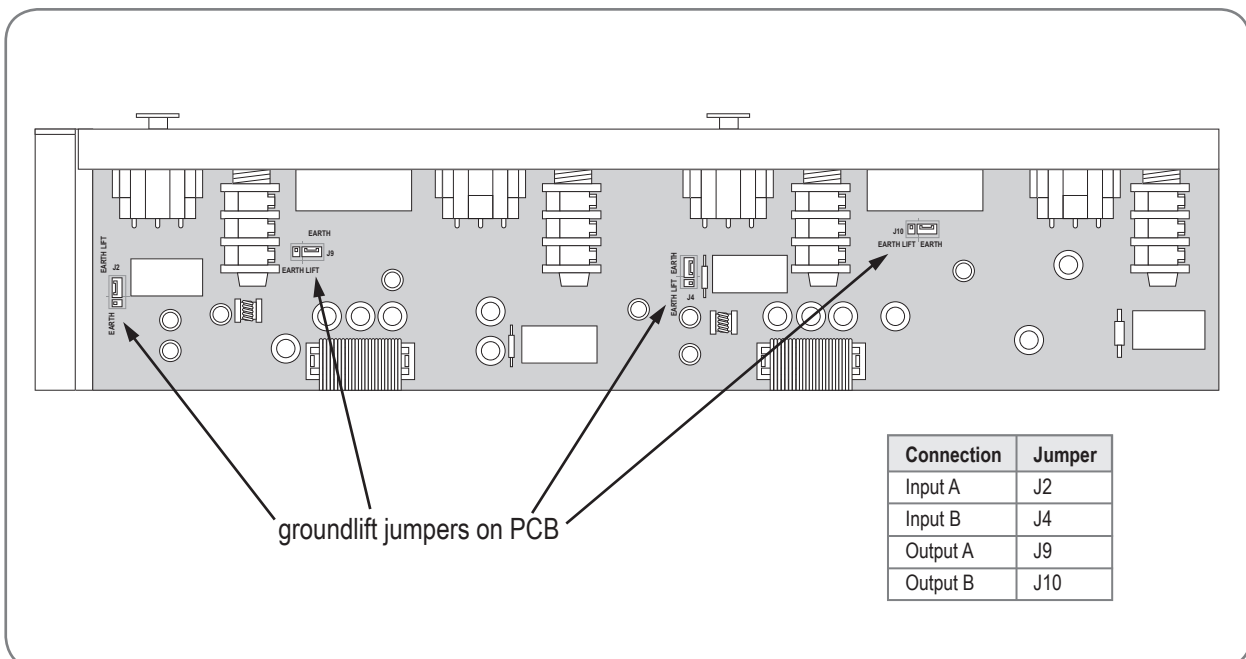
Unbalanced



Unbalanced

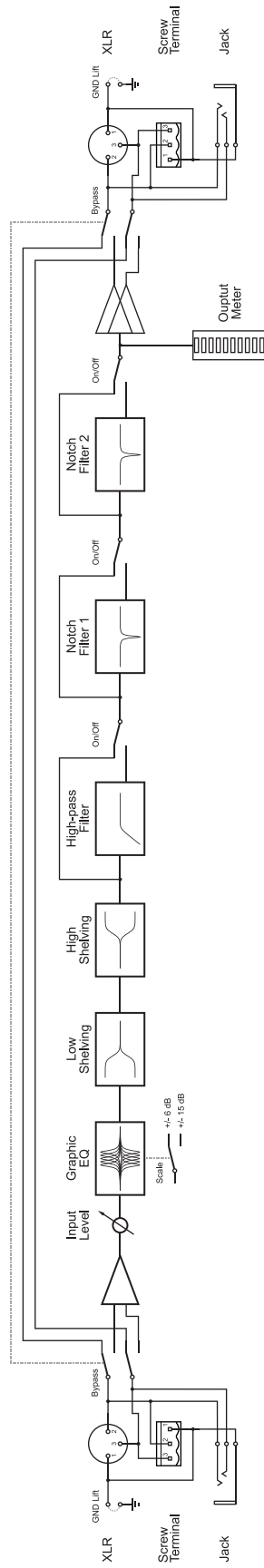


A 'ground lift' facility is available on the dBQ-zero's inputs and outputs, which may be useful in resolving earth hum issues. Normally the XLR's pin 1 is connected to ground, but this connection may be broken by moving an internal PCB jumper.

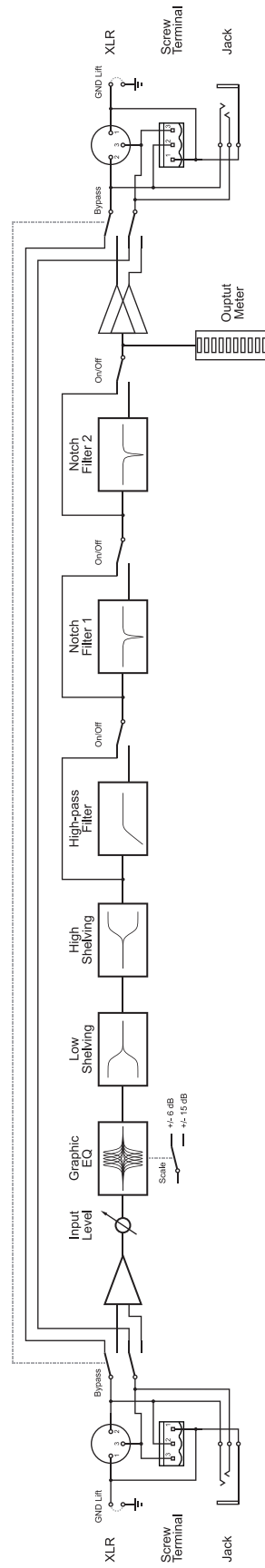


dBQ-zero Block diagram

Channel A



Channel B



Using the dBQ-zero

Operation of the dBQ-zero is straightforward. However, if you would like to know the finer details of this equaliser, then we invite you to read on.

Graphic EQ section

The graphic EQ section consists of 30 faders adjusting the gain of 30 band-pass filters, each spaced by a 1/3rd of an octave. These filters have a fixed centre frequency, as defined by the ISO standard, and a fixed Q-factor.

The Q-factor of a filter is defined as the ratio of its centre frequency to its bandwidth: $Q = f / Bw$. The greater the Q, the smaller the bandwidth. The bandwidth is measured between the ± 3 dB points on either side of the band-pass centre frequency. With Constant-Q designs, such as that found in the dBQ-zero, the bandwidth of each of the band-pass filters stays constant no matter what the boost or cut of the filter is. The use of Constant-Q filters ensures that the composite filter response of the graphic EQ accurately follows the physical positions of the front panel faders. This is achieved by the filters minimising frequency band interaction.

To obtain good results quickly, and to keep the program material as clean as possible, we advise you to start from the lower frequencies and work your way up to the higher frequencies (from left to right). All sounds consist of a fundamental frequency and harmonics (depending on the nature and origin of that sound). When working from low frequencies to high you should aim to change the fundamental first and then its higher harmonics.

Other advice is that it is better to cut than boost. When boosting, you will reduce the overall headroom of the system. If, for example, there is a lack of high frequency content, you can boost those frequencies, but it would be better to cut some of the lower frequencies instead.

Also, try to avoid extreme differences in gain between adjacent bands as this will create large phase shifts. Try to make your equalisation curve as smooth as possible.

Using the **Scale** switch enables the fader gain range to be changed. In its normal position (LED off) the scale is ± 6 dB: this scale is suitable for minor adjustments but with great precision. When the Scale switch is in, the LED will light and you will have access to a range of ± 15 dB.

Adjusting the overall gain

If you have applied gain to multiple frequencies, the signal level may become very high and hence may clip, or cause the

next item of equipment to clip. Use the input level to adjust the overall dBQ-zero gain to keep the signal in an optimal range. Similarly, if multiple frequency bands have been cut use this input gain to amplify the overall level back to normal.

High-pass filter

By using the high-pass filter you can remove unwanted low frequency content/noise, such as hum, rumble or microphone handling noise. This filter has a fixed slope of 12 dB/octave and a cut-off frequency which is adjustable between 20 Hz and 250 Hz.

The high-pass filter may be switched on or off using the switch adjacent to the HPF frequency control. The LED indicator lights when the filter is enabled.

Low and high shelving filters

The low and high shelving filters are used to add or remove excess 'warmth' or 'brightness' respectively. The frequency of both filters is fixed. The low shelving filter has a corner frequency of 100 Hz and the high shelving filter is fixed at 14 kHz.

Using the rotary controls enables you to adjust the level of cut or boost applied to each filter (between ± 9 dB).

Notch filters

The dBQ-zero offers two notch filters per channel, with independent frequency selection and on/off switch. When a notch filter is switched on, the corresponding LED will light. The first notch filter is adjustable between 25 Hz and 1.5 kHz and the second is adjustable between 700 Hz and 18 kHz.

The principle function of the two notch filters is to attenuate any problem frequencies that may be causing feedback or any other unwanted noise. Feedback is most likely to occur at frequencies between the fixed filter bands on the graphical EQ. This is why the notch filters are useful. Furthermore, the notch filters have a higher degree of attenuation than the graphic EQ filters and are therefore more efficient at preventing feedback. Only the centre frequency of the notch filters may be adjusted by the user. The Q-factor and attenuation have been intentionally fixed for ease of use. The attenuation is 20 dB and the Q-factor is 4. These settings are sufficient to remove major sources of feedback without altering too much of the program spectrum.

Similarly to the graphical section, when trying to remove unwanted frequencies start with the notch filter frequency

selection fully counter-clockwise and then gradually increase the frequency. Feedback mostly consists of more than one frequency, but starting at a low frequency ensures you find the fundamental first.

Bypass switch

When enabled, the bypass switch connects the equaliser's input directly to its output, bypassing the input gain and all filter sections. In case of power failure the bypass feature is automatically activated.

LED level meter

The LED level meter consists of a **signal** LED which illuminates when the signal level is above -40 dBu; an 8-segment peak meter (each segment represents a 3 dB increment in level) and a multipoint monitoring **clip** LED.

The peak meter measures the signal at the output of the equaliser, after the input level and all filter sections. It monitors signal peaks as opposed to traditional VU-meter monitoring RMS level. Peak level meters are better adapted to working with today's range of audio equipment.

Both the signal and clip LEDs monitor level at three different points in the signal chain; at the input, after the graphic EQ section and at the output.

Electrical specifications

Balanced line level input

Connectors	¼ TRS jack / 3-pin XLR / screw terminal
Impedance	>10k ohms, balanced
Max. input level	+21 dBu, balanced, 1 % THD+N
CMRR	+21dBu, balanced, 1% THD

Balanced line level output

Connectors	¼ TRS jack / 3-pin XLR / screw terminal
Impedance	< 50 ohm, balanced
Max. output level	+21dBu into 600 ohms, balanced, 1% THD+N

Audio performance (unity gain, all settings flat)

Frequency response	20 Hz - 20 kHz, ±0.5 dB
THD+N	less than 0,005%, +4 dBu, 20Hz- 20 kHz, 22 kHz BW
Signal to Noise ratio	>94 dB ref 4 dBu, 22 kHz BW, un-weighted
Crosstalk	-75 dB, 20 Hz - 20 kHz, +4 dBu, channel-to-channel

Functions

Gain control:	±10 dB
Graphic EQ:	30 x 45 mm faders, switchable boost/cut ±6 dB or ±15 dB, ISO frequencies, constant-Q
High pass filter:	12 dB/octave variable 20 Hz – 250 Hz
HF shelving filter:	±9 dB at 14 kHz
LF shelving filter:	±9 dB at 100 Hz
Two notch filters:	Fixed Q factor of 4, fixed depth of –20 dB, variable frequency control: first 25 Hz–1500 Hz, second 700 Hz–18 kHz

AC power requirements

Voltage	Auto-detect 100 - 240 V - 50/60 Hz
Power consumption	30 VA

Environment

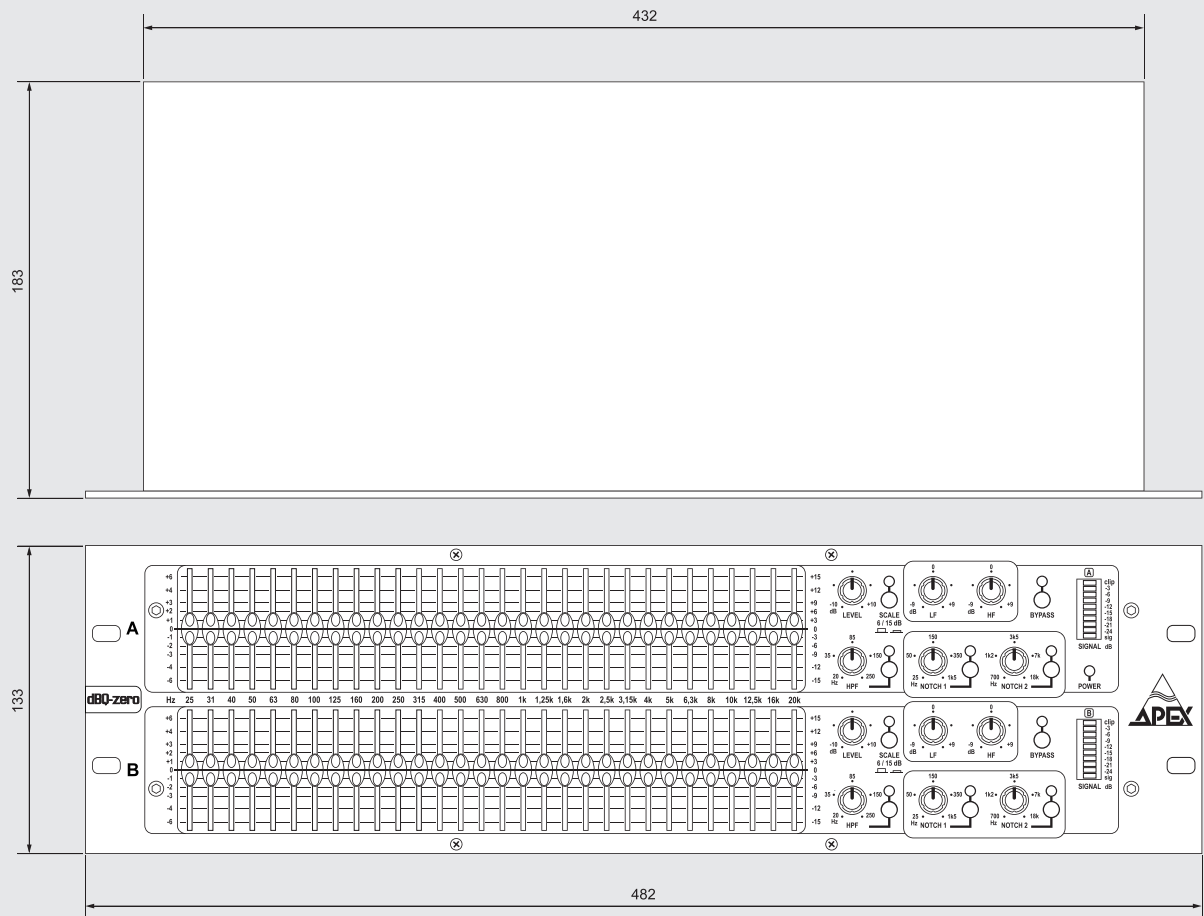
Operating

Temperature	5° to 40° C
Relative humidity	up to 60 %

Storage

Temperature	-20° to 60° C
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Mechanical specifications



Dimensions

Unit	Width	482 mm (19-inch)
	Height	133 mm (3U)
	Depth	183 mm

Package

Width	560 mm
Height	215 mm
Depth	310 mm

Weight

Unit (Nett)	4.2 kg
Package (Shipping)	5.6 kg

In the interest of product development, Apex reserve the right to modify or improve specifications of this product at any time, without prior notice and without any obligation to change or update equipment already delivered.

Limited warranty

Apex N.V. ("Apex") warrants you, the original purchaser, or any party that purchases the device from you, that its products are free from defects in material and workmanship under normal use for a period of two (2) years from the date of original purchase. The date of purchase is the date which appears on the first invoice or any other proof of purchase provided by an Apex approved dealer.

Subject to the conditions and limitations set forth below, Apex will, at its discretion, either repair or replace any part of its products that prove to be defective, provided that the product is returned with proof of purchase, shipping prepaid, to an authorised Apex approved service facility.

Warranty cover of any repairs will only extend to the end of the original warranty period.

We will be happy to provide you with a list of authorised dealers to whom you can return the defective unit or who will give you a returns note to enable you to send the unit to the factory.

Service turn-around time will be as fast as reasonably possible. If you are not satisfied with the repair, contact Apex.

Exclusions and limitations

This limited warranty covers only repair or replacement for defective products manufactured by Apex. Apex is not liable for, and does not cover under warranty, any loss of data or any costs associated with determining the source of system problems or removing, servicing or installing Apex products. This warranty excludes 3rd party software, connected equipment or stored data. Apex does not warrant that the operation of the product will be uninterrupted or error-free. In the event of a claim, Apex's sole obligation shall be replacement of the hardware.

This limited warranty does not cover:

- (1) any damage to this product that results from improper installation, accident, abuse, misuse, natural disaster, insufficient or excessive electrical supply, abnormal mechanical or environmental conditions or other external causes;
- (2) any damage caused by operating the product outside the permitted or intended uses described by Apex;
- (3) any damage caused by any unauthorized disassembly, repair, or modification;
- (4) consumable parts, such as batteries;
- (5) any cosmetic damage.

Apex is not liable for consequential damages.

This limited warranty also does not apply to any product on which the original identification information (including serial number) has been altered, obliterated or removed or any product that has not been handled or packaged correctly.

Warranty services will be furnished only if the product is accompanied by a copy of the original retail dealer's invoice.

Warranty claims other than those indicated above are expressly excluded.

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