

# PQ

## Mastering Equalizer



Manual



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# Version 1.3 – 04 / 2017

Developer: Wolfgang Neumann / Bastian Neu

This manual includes a description of the product but no guarantee as for specific characteristics or successful results.

Unless stated otherwise, everything herein corresponds to the technical status at the time of delivery of the product and user manual by SPL electronics GmbH.

The design and circuitry are under continuous development and improvement.  
Technical specifications are subject to change.

## Package Contents

### PQ Mastering Equalizer

Power cord

Manual

The PQ Equalizer is available in different colors.

Black:	Modell 1540
Red:	Modell 1544

Do consider keeping the original packaging. It can come in very useful whenever you need to transport your gear. If there is ever the need to send it in for repair, the original packaging guarantees a safe shipment.

## King of the parametric equalizers

The **PQ Mastering Equalizer** is a fully parametric, dual-channel five-band equalizer.

The PQ Mastering Equalizer – Model 1540/1544 is a new revised edition of the well-known SPL PQ Mastering Equalizer – Model 2050.

Both units are based on our 120V Rail Technology. The new PQ features the same high-quality characteristics as the previous model.

All five bands can each be activated or deactivated and you got the possibility (for every single band) to separately switch between Constant Q and Proportional Q. This kind of circuit has not yet been achieved in any other equalizer.

Each channel can completely be activated or deactivated, thanks to Auto-Bypass, even automated in a freely selectable time frame.

Bypass of each band and constant Q of the left side can be controlled by the right side in Link mode.

Thanks to the 1/4 Gain-Switch, you can reduce a maximum increase or attenuation of the amplitude by the factor 3/4, which regulates the potentiometer from max +/-20 dB to +/-5 dB cut. This gives you the possibility to perform small corrections, as common in Mastering or higher amplitudes in Proportional-Q mode.

Thanks to the detented potentiometers, a precise recall is very easy to realize. You can also adjust parameters Gain, Frequency and Q in 41 steps with the detented potentiometers.

The **PQ Mastering Equalizer** was designed, developed and manufactured in Germany.

# Technical Aspects

## 120 Volt Technology

SPL's goal was to push analog signal processing to the limits. That's why we combined the best possible components with a high-grade optimized circuit design.

We have been using the in-house developed 120-volt technology - the highest-ever operating voltage used for audio applications - in all our products from the Mastering series for years. Some of the most highly respected Mastering studios today revolve around SPL consoles and signal processors from our Mastering series (Bob Ludwigs Gateway Mastering & DVD in the USA, Simon Heyworth's Super Audio Mastering in the UK, Galaxy Studios in Belgium, and the legendary Wisseloord in the Netherlands, for instance).

The 120-volt technology is based on op-amps developed internally by SPL's co-founder and Chief Developer Wolfgang Neumann. The IRON features the most advanced generation of these op-amps. They boast better tech specs thanks to the thermal behavior optimization they underwent under the hands of Bastian Neu.

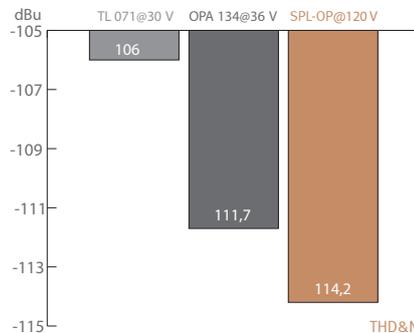
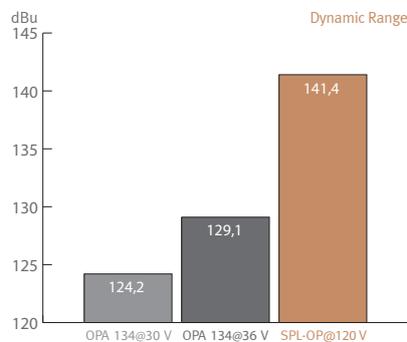
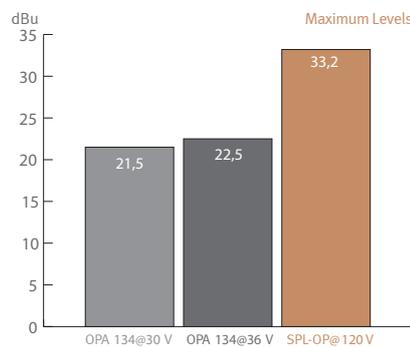
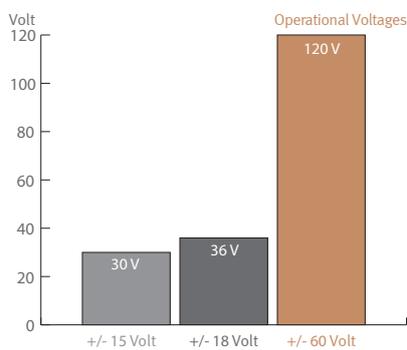
Ultimately, the supply voltage is key for the overall dynamic response of a processor. Voltage is to an electrical circuit what cylinder capacity is to an internal combustion engine:

You can't replace cylinder capacity with anything else, except more cylinder capacity.

## 120 Volt Technology - Diagrams

These diagrams clearly show the advantages of our 120-volt technology in comparison to other circuits with a lower operating voltage. The direct relation between operating level and maximum level is fundamental for the classification: the higher the operating level, the higher the maximum level a circuit can handle. And since virtually all essential acoustic and musical parameters depend on this relation, a higher operating voltage also has a positive impact on the dynamic range, distortion limit and signal-to-noise ratio. The result is a clearly more laid-back and natural sound with less unpleasant coloring.

Do bear in mind that dB scales do not represent linear but rather exponential increases. A 3 dB increase corresponds to doubling the acoustic power, +6 dB correspond to twice the sound pressure level, and +10 dB correspond to twice the perceived loudness.



When it comes to volume, the 120-volt technology exhibits a performance that is twice that of common components and circuits, in regard to maximum level and dynamic range, with values that are approximately 10 dB higher. THD measurements of the SPL op-amps show a difference of more than 3 dB compared to the OPA134 at 36 V — in terms of sound pressure level, that corresponds to an improvement of more than 50%.

The operating level most commonly used for audio equipment is 30 volts.

# Installation

## Voltage Selection

Before connecting the PQ to the mains, make sure that the voltage selection corresponds to the values of your local power grid (230 or 115 volts) Inside the power connector, to the right, next to the on/off switch, there is an opening that displays the voltage selected. If the voltage indicated does not correspond to the one required, change it by following this procedure:

Open the power connector lid with a small screwdriver (use the tiny slots on the right hand side). Use the screwdriver to lever the red fuse holder from above until you can grab it. Take the fuse holder out and replace the fuse with one corresponding to the local power grid specifications. You can find the adequate values on the rear of the unit or on page 12 of this user's manual. Turn the fuse holder around 180 degrees and place it back again. When you close the lid again, you should see the correct voltage displayed in the opening

## First Steps

Before turning on the PQ you must first connect the included 3-pin power cord to the 3-pin IEC socket. The transformer, power cord and IEC socket all comply to the VDE, UL and CSA regulations.

The PQ should not be installed in close proximity to equipment that emits magnetic fields or emanates heat. Avoid exposure to heat, moisture, dust, and vibrations. Do not install the PQ close to any power amps or digital processors. Instead, install it in a fully „analog rack” where any interferences can be avoided (Word Clock, SMPTE, MIDI etc.).

The unit should be powered off before connecting or disconnecting any cables or equipment to it.

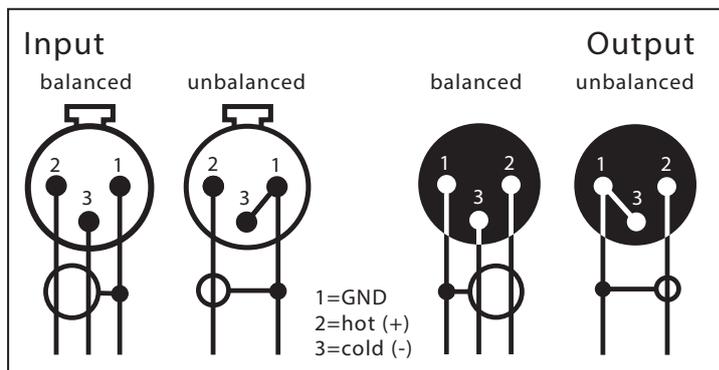
Use the On/Off switch on the rear panel to turn the unit on or off. The illuminated red LED in the middle of the front panel indicates the unit's operating status. The On/Off switch was placed on the rear panel to avoid any emissions due to voltage-carrying conductors running across the unit and affecting sound. When powering on or off, there's no need to observe a specific sequence regarding the connected devices. However, like with any audio signal chain, power amplifiers should always be powered on last and powered off first. The PQ can be powered on and off with the use of a circuit breaker, as long as the total load does not exceed the rating of the latter.

## XLR inputs and outputs

We used exclusively Switchcraft/Neutrik XLR input and output plugs to guarantee perfect connectivity in the studio. They provide an optimal connection thanks to their electromechanical design and large contact surface.

The image shows the XLR connectors pinout. They are balanced and have three conductors or wires. Conductor 2 (Pin 2) corresponds to the (+) or hot Signal.

In case an unbalanced connection is necessary, the correct polarity of the conductors needs to be observed.



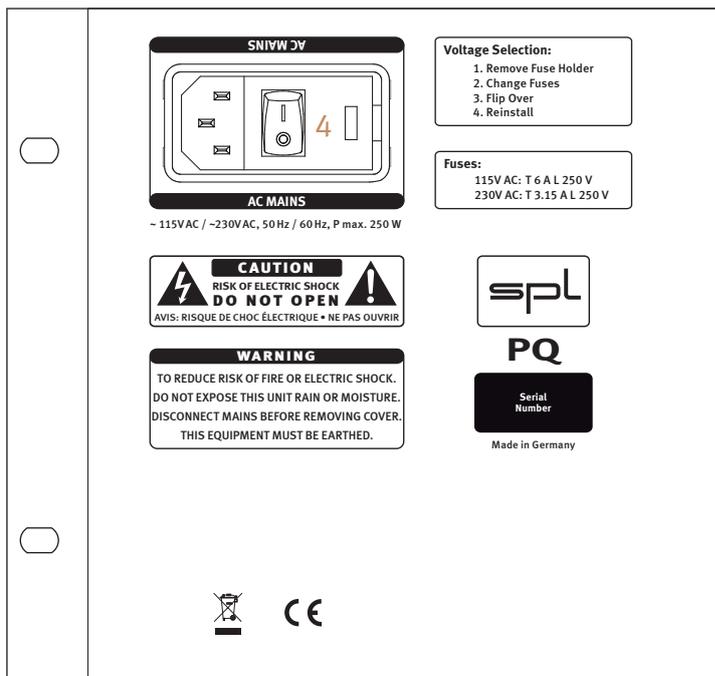
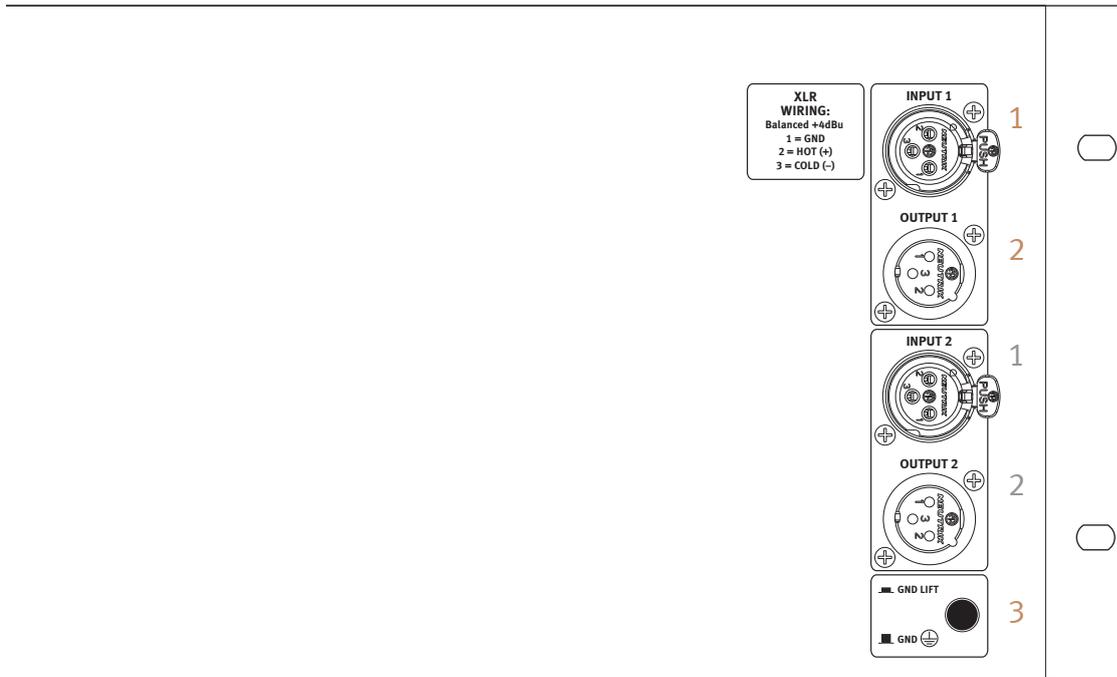
## Ground Lift switch to avoid ground loops

On the rear panel of the PQ Mastering Equalizer (see page 8) is also a „GND LIFT“ (Ground Lift) switch to avoid any ground loops. Ground loops take place when gear connected in the same network have different potentials.

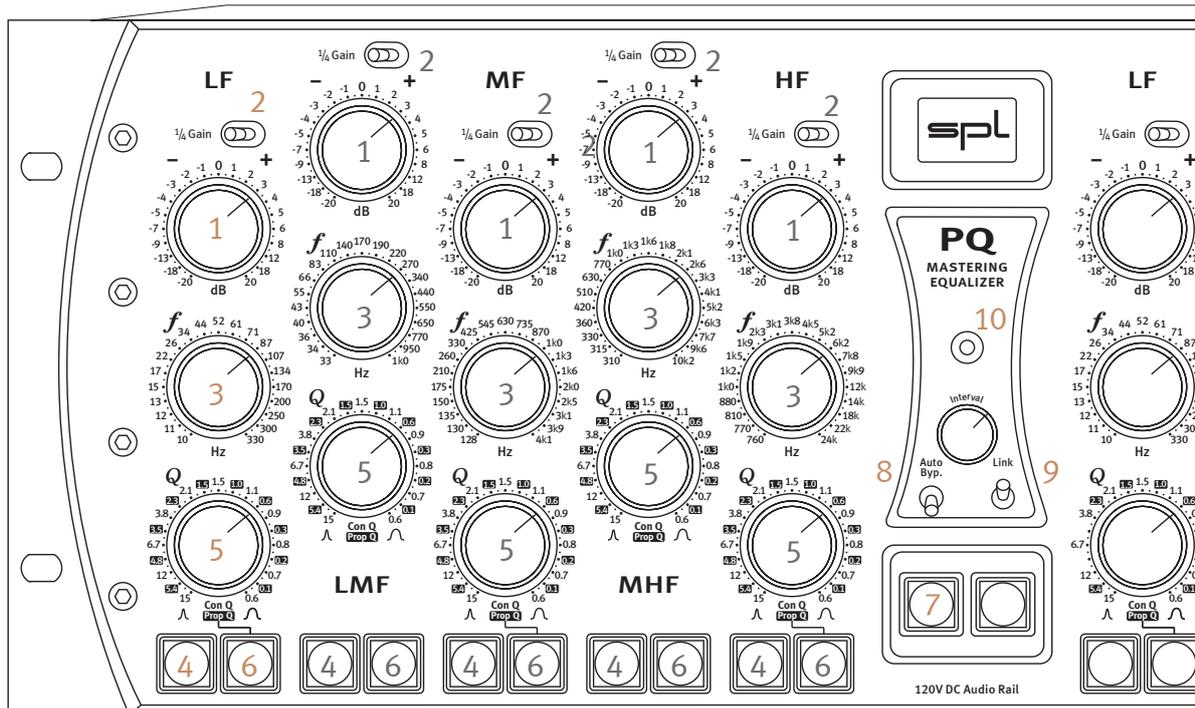
The GND LIFT switch disconnects the equipment ground from the service ground to avoid such problems. The Ground Lift function is activated (= equipment ground disconnected) when the switch is depressed.

# Cabling: Rear Side

- 1 Input
- 2 Output
- 3 Ground Lift (see details on page 7)
- 4 Voltage (see details on page 6)



# Control Elements



- 1 Gain
- 2 1/4 Gain
- 3 Frequency
- 4 LF, LMF, MF, MHF, HF -Button (orange)
- 5 Q
- 6 Prop. Q -Button (blue)
- 7 Channel Switch
- 8 Auto Bypass
- 9 Link
- 10 Power-LED

# Control Elements

## Gain

The amplitude setting ranges from -20 dB up to +20 dB. This means that you can increase or attenuate the amplitude to a maximum of 20 dB. The maximum increase or attenuation also depends on the selected Q-Characteristic.

## 1/4 Gain

Thanks to the 1/4 Gain-Switch, you can reduce a maximum increase or attenuation of the amplitude by the factor 3/4, which regulates the potentiometer from max +/- 20 dB to +/- 5 dB cut. This gives you the possibility to perform small corrections, as common in Mastering, in a very accurate manner. Thanks to the preciseness and sensitivity of the 1/4 Gain-Switch you can finely control and work on the sound material with the detented potentiometers.

## Frequency

Each channel provides five frequency bands. All bands are fully parametric and can independently be activated or deactivated. The workable frequency range stretches from 10 Hz to 24 kHz.

Frequency Range:

- LF (Low Frequencies): 10 Hz bis 330 Hz
- LMF (Low Mid Frequencies): 33 Hz bis 1 kHz
- MF (Mid Frequencies): 128 Hz bis 4,1 kHz
- HMF (High Mid Frequencies): 310 Hz bis 10 kHz
- HF: (High Frequencies): 760 Hz bis 24 kHz

## LF, LMF, MF, MHF, HF -Button (orange)

These buttons switch the 10 filter bands on (button lights up) or off (light off).

## Q

You can adjust the bandwidth from 0.08 Q to 5,8 Q in Proportional-Q mode, 0,6 Q to 15 Q in Constant-Q mode – this maximum value allows to perform corrective applications with maximum precision in Constant-Q mode.

## Prop. Q -Button (blue)

Thanks to this button, each of the 10 filter bands can be set from Constant-Q mode (light off) into Proportional-Q mode (button lights up).

### Proportional-Q mode / Constant-Q mode

Each frequency band consists essentially of two fully parametric equalizers: one for constant Q mode and one for proportional (or variable) Q mode, selectable per band. The PQ is the first equalizer to offer both modes, endowing it with double equalization power for demanding corrective (Constant-Q) and creative applications (Proportional-Q).

In constant Q mode, the selected bandwidth remains unaffected by the amplitude setting, making it the best choice for corrective applications (e.g. to eliminate unwanted frequencies). In proportional Q mode, the amplitude is reduced as the bandwidth is raised and vice versa. With the smallest bandwidth setting, the maximum amplitude reaches +/- 20 dB, while it is reduced to +/- 2.8 dB with the broadest bandwidth setting. The Proportional Q mode is better suited for creative, sound-shaping applications, as a bandwidth-related amplitude allows for sensible, musically suggestive operation – with raising bandwidths, higher amplitudes are increasingly less useful.

## Channel Switch

You can activate or deactivate the right or the left channel with the two centrally located orange illuminated buttons.

## Auto Bypass

To be able to make an objective judgment of the processed material, it is best not to have to be toggling between the original and processed signals by yourself, but rather have it done automatically. Plus, the fact that you do not have to move from the sweet spot and can concentrate better on the music to optimally assess the processing is a huge advantage. The Interval control determines the time that needs to elapse before the compressor toggles between the processed and unprocessed signals. Hard left is the shortest setting. To increase the interval, turn the knob clockwise.

## Link

The PQ Mastering Equalizer has been designed as a completely independent two-channel equalizer and can be used to process two different mono signals at the same time. Nevertheless, you can also easily process a stereo signal. If you activate the Link function, settings LF, LMF, MF, MHF, HF On/Off and Prop. Q on both sides are collectively controlled by the buttons of one side. This allows you to activate or deactivate a filter band or the Q-Characteristic on both sides of the equalizer with the use of a button. Amplitude, 1/4 Gain, Frequency and Bandwidth are excluded in this process. According to the factory setting, the right side controls the left side in Link mode. However, this setting can be adjusted to your individual working habits. If you press the channel switch of one of the channels until it starts flashing, from then on this side will control the other channel.

# Specifications

## Measurements

### Inputs

Max. Input Level ..... + 32,5 dBu  
Input Impedance ..... 20 kOhms (balanced)

### Outputs

Max. Output Level ..... + 32,5 dBu  
Output Impedance ..... < 600 ohms (balanced)

Harmonic Distortion: at -30 dBu: 0,2%  
at -20 dBu: 0,05%  
at 0 dBu: 0,01%  
at +10 dBu: 0,002%  
at +30 dBu: 0,0005%

Noise (unweighted, at 24 dBu, Band 1-5 ON, B/C = 0) ..... - 91,2 dBu  
Noise (A-weighted, at 24 dBu, Band 1-5 ON, B/C = 0) ..... - 94,3 dBu  
Noise (CCIR, at 24 dBu, Band 1-5 ON, B/C = 0) ..... - 85,77 dBu

THD & N (at 24 dBu, Constant-Q) ..... > 107,1 dB  
THD & N (at 24 dBu, Proportional-Q) ..... > 106,1 dB

Common-Mode-Rejection:..... >-82 dBu  
(at 1 kHz, Max. Gain +34 dBu, Band 1-5 ON, B/C = 0)

Transmission Bandwidth: 10 Hz-100 kHz  
(-3 dB, Band 1-5 ON, B/C = 0)

Frequency Range: 10 Hz-24 kHz

Power Consumption: ..... 0,4 Amp, 230V/50Hz, 61 Watt, 92 VA  
0,8 Amp, 115V/60Hz, 61 Watt, 92 VA

Fuses ..... 230 V/50 Hz: 3,15 Amp  
115 V/60 Hz: 6,3 Amp

### Dimensions

Standard EIA 19 Inch Housing/4U ..... 482 x 177 x 311,5 mm / ca. 19" x 7" x 12,25"  
Weigh ..... 15,2 kg / 33,5 lb

## Connections

Only use the connections as described. Other connections can lead to health risks and damage the equipment.

## Water and humidity

Do not use this device anywhere near water (for example in a bath room, a damp cellar, near swimming pools, or similar environments). Otherwise you are dealing with an extremely high risk of fatal electrical shocks!!

## Insertion of objects or fluids

Be careful to not insert any object into any of the chassis openings. You can otherwise easily come into contact with dangerous voltage or cause a damaging short circuit. Never allow any fluids to be spilled or sprayed on the device. Such actions can lead to dangerous electrical shocks or fire!

## Ventilation

The vent openings on the unit are meant to avoid the IRON from overheating. You should never cover nor block these openings.

## Power Supply

Power the unit exclusively with the voltage rating specified on the unit. In case of doubt, contact your local dealer or electric provider. Disconnect the unit from the electric power grid if you are not going to use it for a long period of time. Unplug the power chord from the mains to cut power supply to the unit. Always make sure that the mains plug is easily accessible.

## Opening the unit

Simply put: DON'T, if you are not a certified SPL technician or engineer. Really: Do not open the device housing, as there is great risk you will damage the device, or – even after being disconnected – you may receive a dangerous electrical shock!.

## Cord protection

Make sure that your power and audio signal cords are arranged to avoid being stepped on or any kind of crimping and damage related to such event. Do not allow any equipment or furniture to crimp the cords. Power connection overloads: Avoid any kind of overload in connections to wall sockets, extension or splitter power cords, or signal inputs. Always keep manufacturer warnings and instructions in mind. Overloads create fire hazards and risk of dangerous shocks!

## Lightning

Before thunderstorms or other severe weather, disconnect the device from wall power; do not do this during a storm in order to avoid life threatening lightning strikes. Similarly, before any severe weather, disconnect all the power connections of other devices and antenna and phone/network cables which may be interconnected so that no lightning damage or overload results from such secondary connections.en.

# Security Advices

## Controls and switches

Operate the controls and switches only as described in the manual. Incorrect adjustments outside safe parameters can lead to damage and unnecessary repair costs. Never use the switches or level controls to effect excessive or extreme changes.

## Repairs

Unplug the unit from all power and signal connections and immediately contact a qualified technician when you think repairs are needed – or when moisture or foreign objects may accidentally have reached inside the housing, or in cases when the device may have fallen and shows any sign of having been damaged. This also applies to any situation in which the unit has not been subjected to any of these unusual circumstances but still is not functioning normally or its performance is substantially altered. In cases of damage to the power supply and cord, first consider turning off the main circuit breaker before unplugging the power cord.

## Replacement/substitute parts

Be sure that any service technician uses original replacement parts or those with identical specifications as the originals. Incorrectly substituted parts can lead to fire, electrical shock or other dangers, including further equipment damage. Safety inspection: Be sure always to ask a service technician to conduct a thorough safety check and ensure that the state of the repaired device is in all respects up to factory standards.

## Cleaning

Do not use any solvents, as these can damage the chassis finish. Use a clean, dry cloth (if necessary, with an acid-free cleaning oil). Disconnect the device from your power source before cleaning

## Notes on Environmental Protection

At the end of its operating life, this product must not be disposed of with regular household waste but must be returned to a collection point for the recycling of electrical and electronic equipment. The wheelie bin symbol on the product, user's manual and packaging indicates that. The materials can be reused in accordance with their markings. Through reuse, recycling of raw materials, or other forms of recycling of old products, you are making an important contribution to the protection of our environment. Your local administrative office can advise you of the responsible waste disposal point.

WEEE Registration: 973 349 88.

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## Declaration of CE Conformity

The construction of this unit is in compliance with the standards and regulations of the European Community.

Artist:

Engineer:

Album:

Track(s)/Groups:

Titel:

Date:

