

# Professional Fidelity

Mastering Grade Listening



This User Manual is optimized for Acrobat Reader.

Interactive buttons may not appear in other applications.

## Phonitor x – User Manual

Headphone Amplifier and Preamplifier



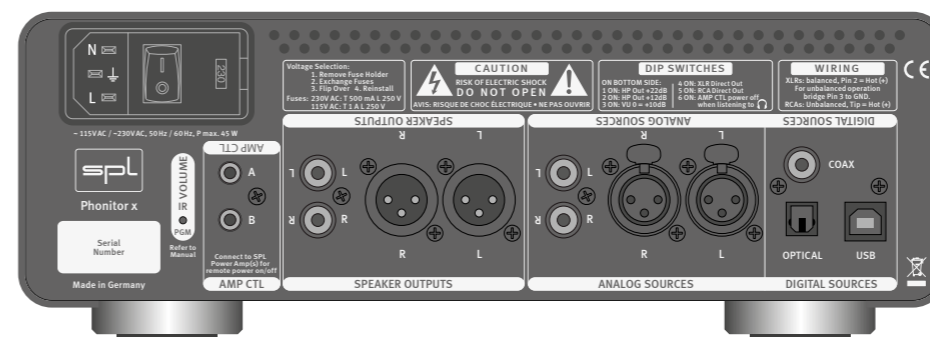
# Welcome

and thank you for choosing the Phonitor x.

The Phonitor x is the ultimate headphone amplifier. It offers connections for headphones operated both balanced and unbalanced. With up to 3.7 W output power the Phonitor x delivers an impressive performance.

The Phonitor x is not just a headphone amplifier, but also an excellent preamplifier that can drive power amplifiers or active speakers.

VOLTAiR technology is what we also call the SPL 120V Rail Technology within the Professional Fidelity series. This makes the Phonitor x an outstanding device in terms of dynamic range, signal-to-noise ratio and headroom delivering an exceptional sound experience with invincible serenity, transparency and realness.



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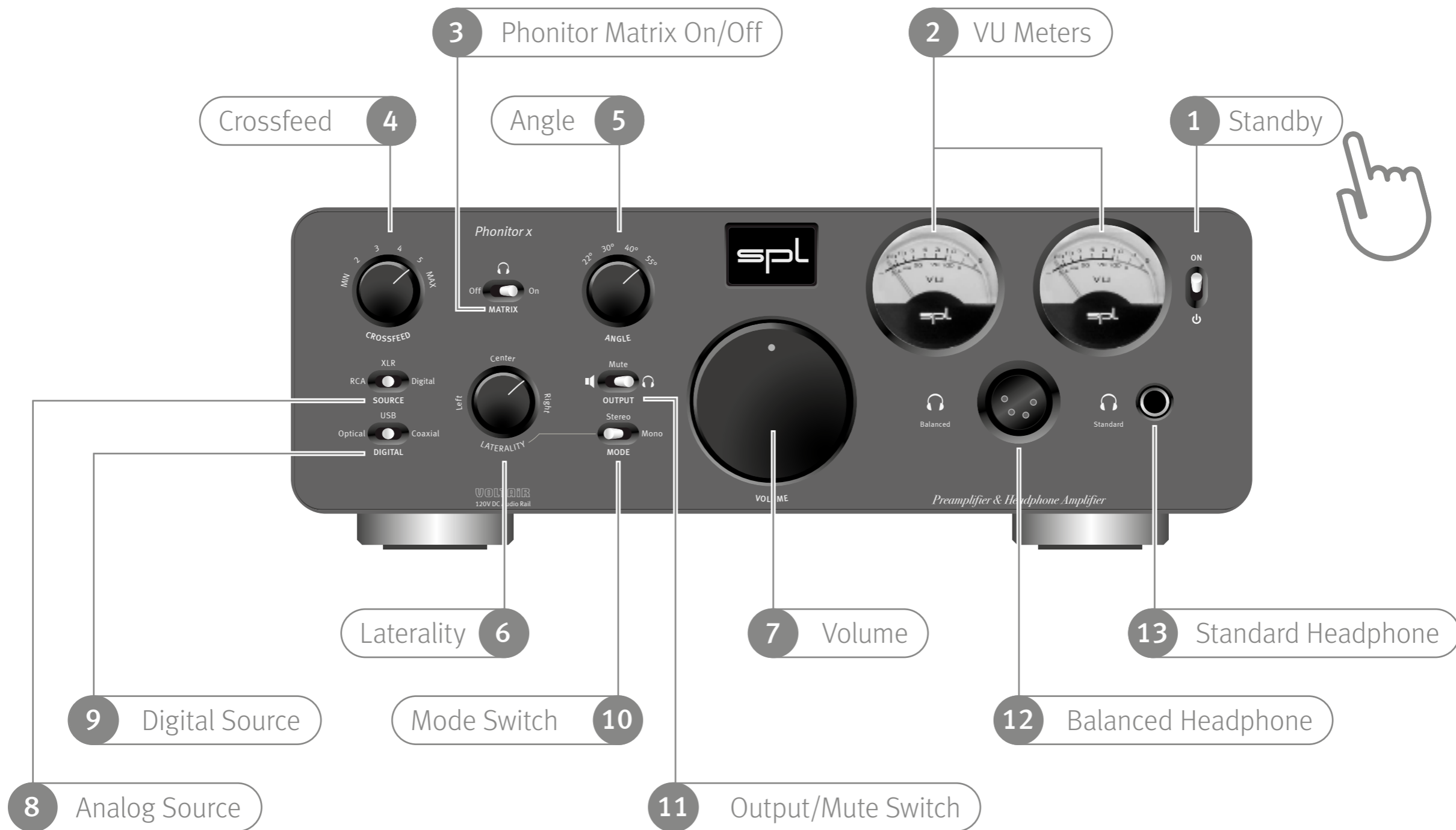


# Getting started

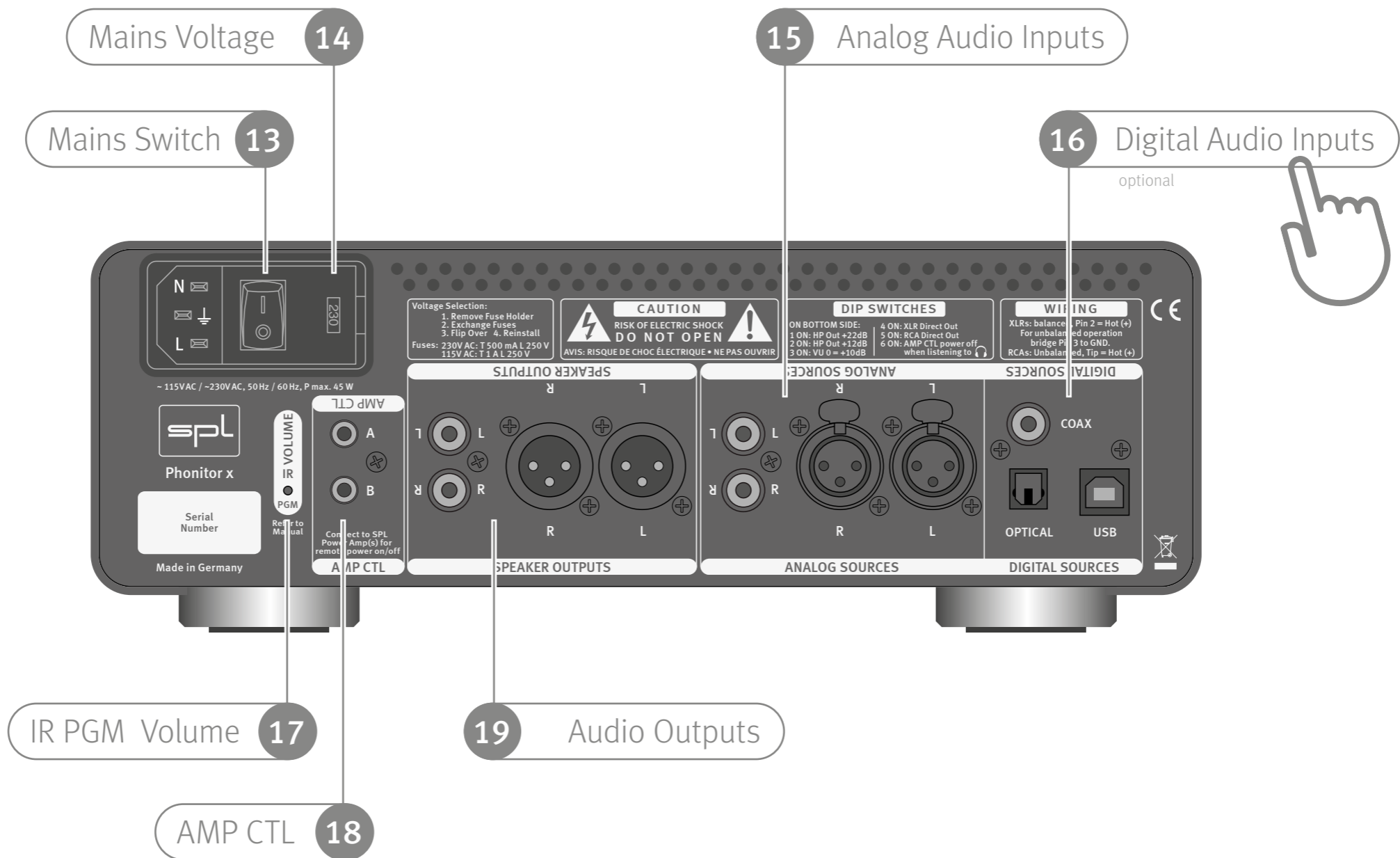
Read thoroughly and follow the instructions as well as the security advices of the Quickstart which is enclosed in the scope of delivery! You can also download the Quickstart [here](#).

- By pressing the -Button you get to the table of contents.
- By pressing the -Button you get to the front view of the unit.
- By pressing the -Button you get to the rear view of the unit.
- By pressing the -Button you get to the bottom view of the unit.
- By pressing the -Button you get to the previous content.

# Front view

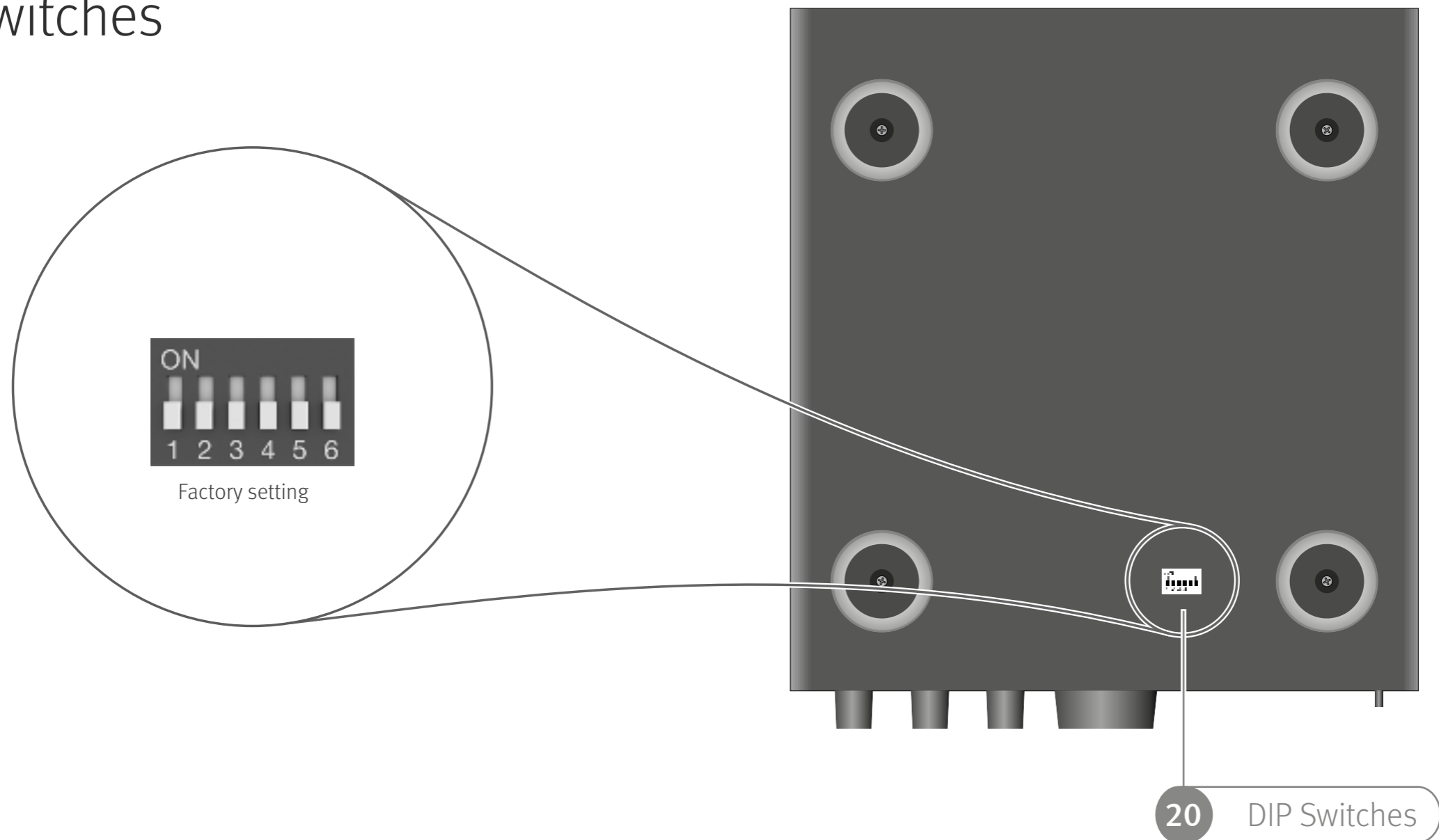


# Rear view



# Bottom view

## DIP switches



# VOLTAiR – 120V Rail Technology

VOLTAiR is the synonym for our 120V Rail Technology within the Professional Fidelity series. The audio signals are processed with an unequalled  $\pm 60V$  DC, which corresponds to twice that of discrete operational amplifiers and four-times that of semiconductor operational amplifiers.

VOLTAiR Technology reaches outstanding technical and sonic performances. Technically especially in terms of dynamic range and headroom and sonically especially in reproducing the finest details and delivering a totally relaxed sounding audio experience. Music sounds absolutely natural.

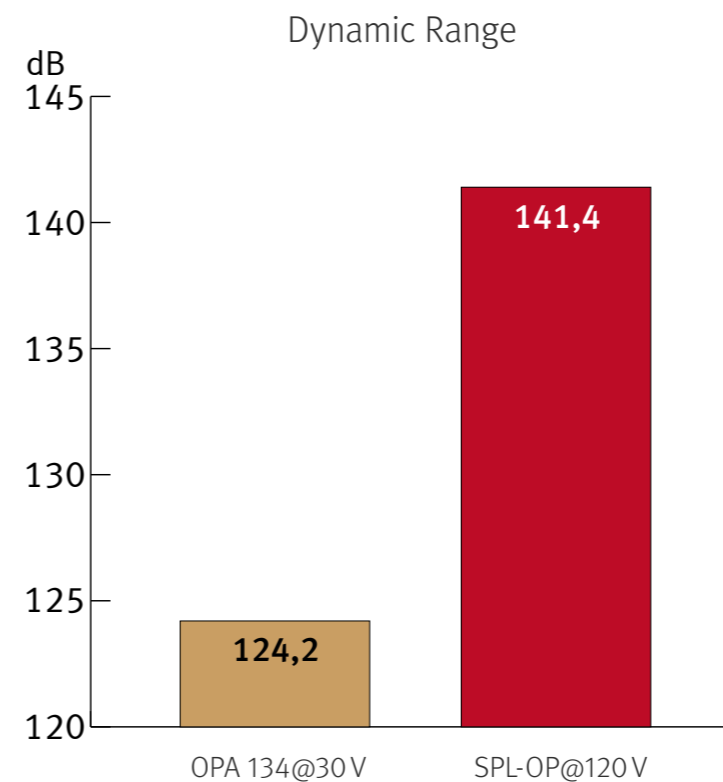
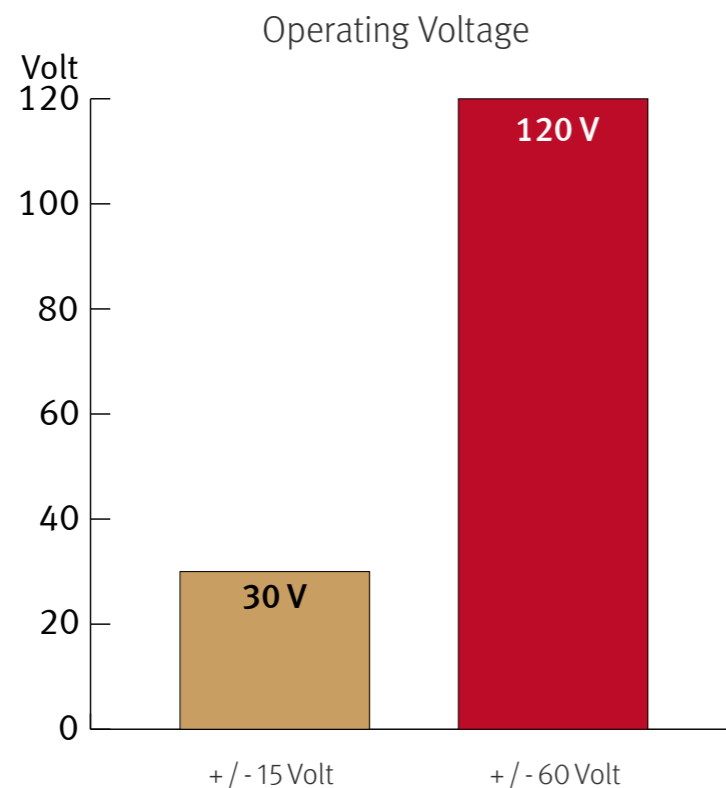
SPL's 120V Rail Technology is the internal audio processing voltage ( $\pm 60V$  DC).  
It is not to be confused with the external mains voltage (e.g. 115V or 230V AC).



# Comparisons

These diagrams show how our VOLTAiR Technology compares to other circuits.

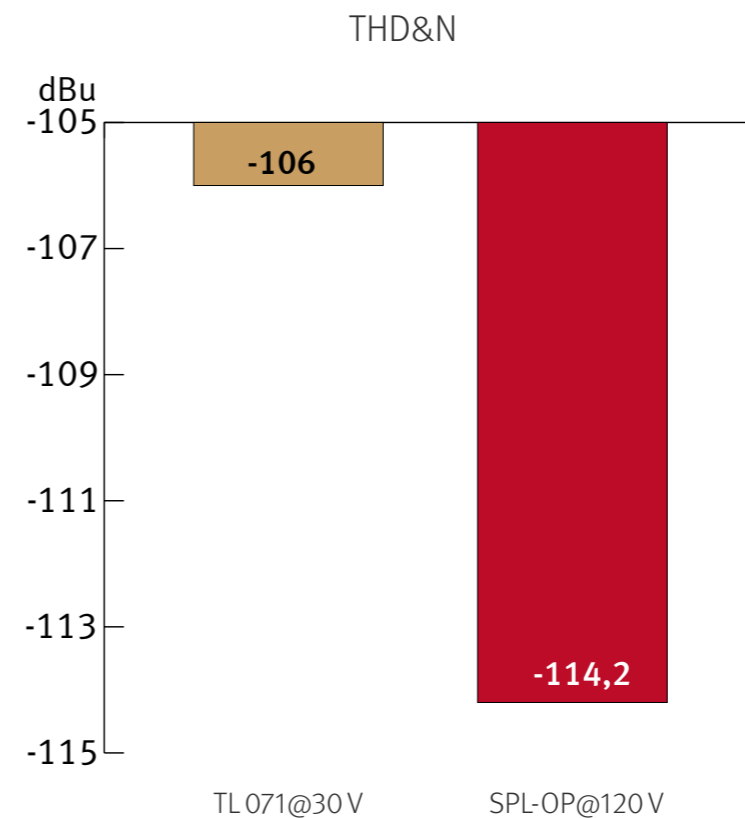
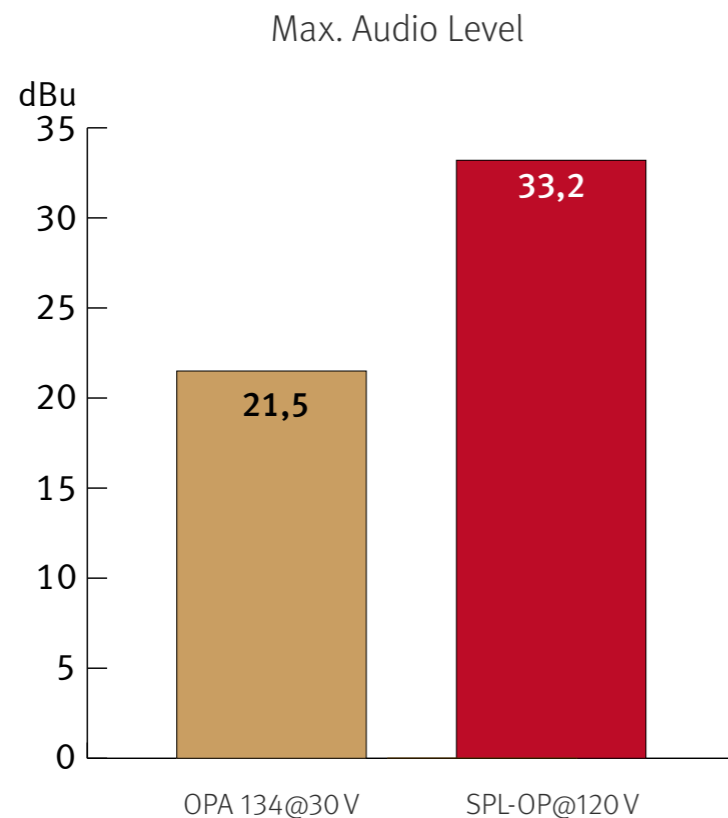
The direct relation between operating level and maximum level is fundamental for the classification: the higher the operating level, the higher the maximum level a circuit can handle. And since virtually all essential acoustic and musical parameters depend on this relation, a higher operating voltage also has a positive impact on the dynamic range, distortion limit and signal-to-noise ratio.



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 VOLTAiR Technology exhibits a performance, in regard to maximum level and dynamic range, that is twice that of common components and circuits given that its values are approximately 12 dB higher.

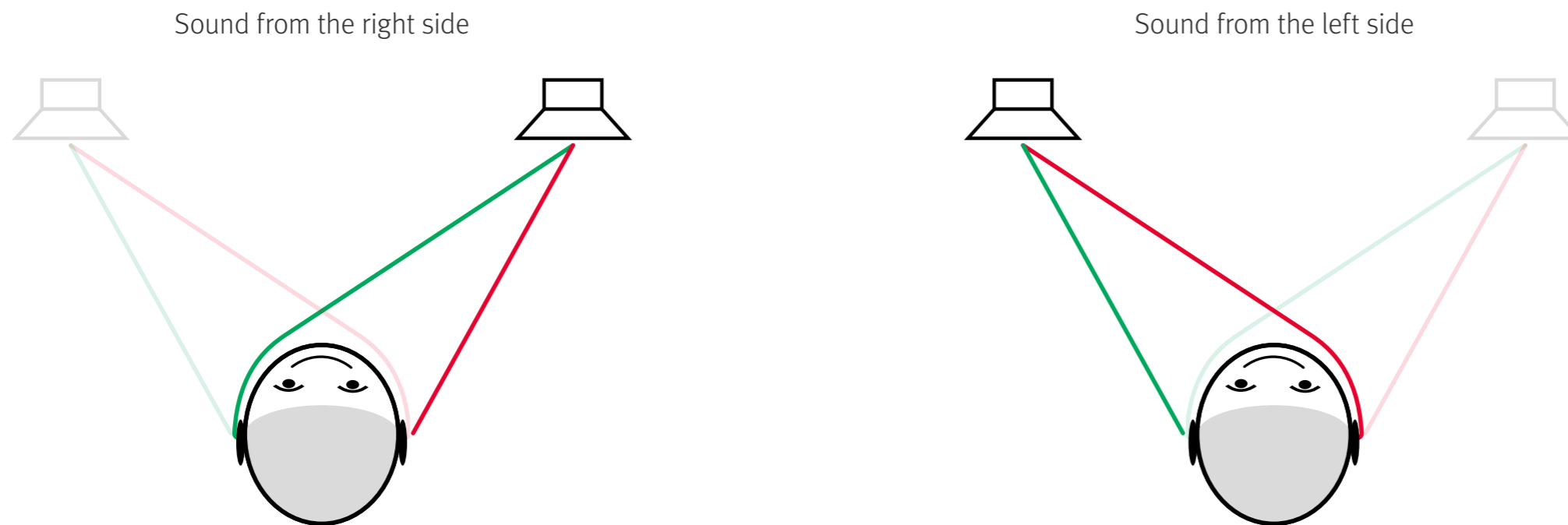
THD measurements show a difference of more than 8 dB compared to the TL071 at 30 V — in terms of sound pressure level, that corresponds to an improvement of more than 130%. The operating level most commonly used for audio equipment is +/- 15 volts.



# Phonitor Matrix

## Basics of stereo listening

When listening to speakers sound coming from the right is not only perceived with the right ear (red line) but it is also perceived with the left ear (green line). The sensation is time delayed, lower in level and has a reduced frequency range (this applies to the left speaker accordingly).



It arrives later because the signal travels a distance of approx. 340 meters per second and the distance from the right speaker to the left ear is longer than it is to the right ear. It is quieter and does not deliver the full frequency range, because the signal of the right speaker does not directly arrive at the left ear but is partially reflected and absorbed by the head.

Our brain determines the direction of the sound by perceiving the time delay (interaural time difference) and the level difference (interaural level difference).

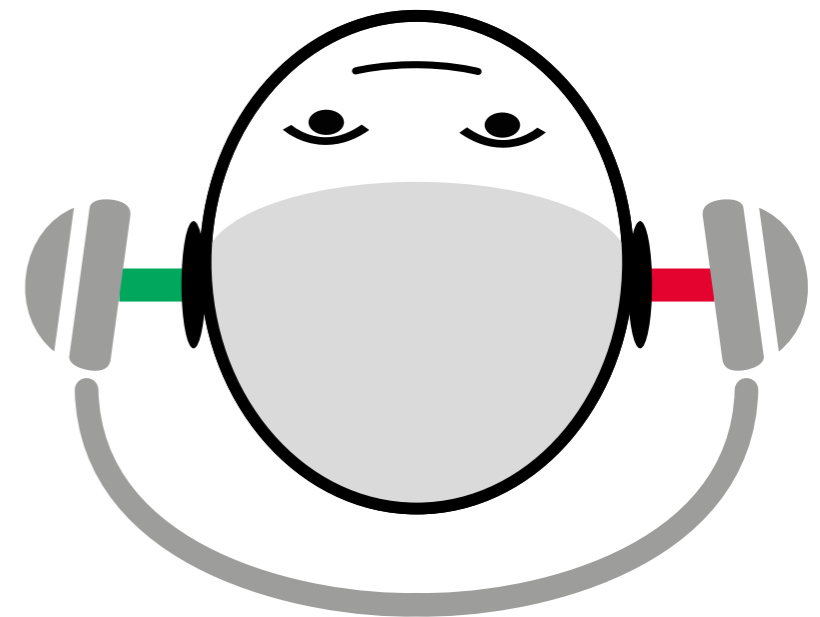
## Stereo listening with an “traditional” headphone preamplifier

When listening to music with a traditional headphone amplifier, the right ear only perceives the right signal (red line) and the left ear only perceives the left signal (green line).

The delayed and quieter signal of the respective opposite side is missing. This unnatural sound irritates the ear and is stressful for our brain, because it constantly is busy trying to locate the direction of the sound.

Besides, this super-stereo-effect leads to an exaggerated stereo width. Instruments that are placed in the stereo field appear to be located much further outside than desired.

These unnatural effects are corrected by the Phonitor Matrix.



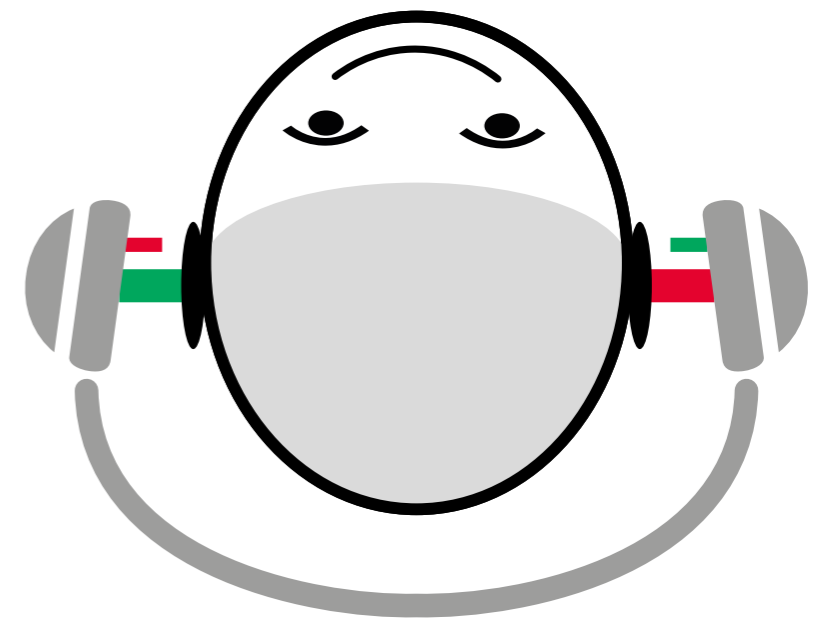
## How does the Phonitor Matrix work?

In simple terms, the Phonitor Matrix creates a speaker-like listening experience on headphones. It calculates the time and level differences with their specific frequency responses to deliver a true rendition of a speaker playback.

Because time and level differences are set like real loudspeaker placement, the brain is able to correctly identify the direction of the sound.

You can perceive a speaker-like listening experience.

All instruments appear at the correct position within the stereo image – just like it was intended when it was mixed in the studio. In comparison to a traditional headphone amplifier it provides the best conditions minimizing hearing fatigue.



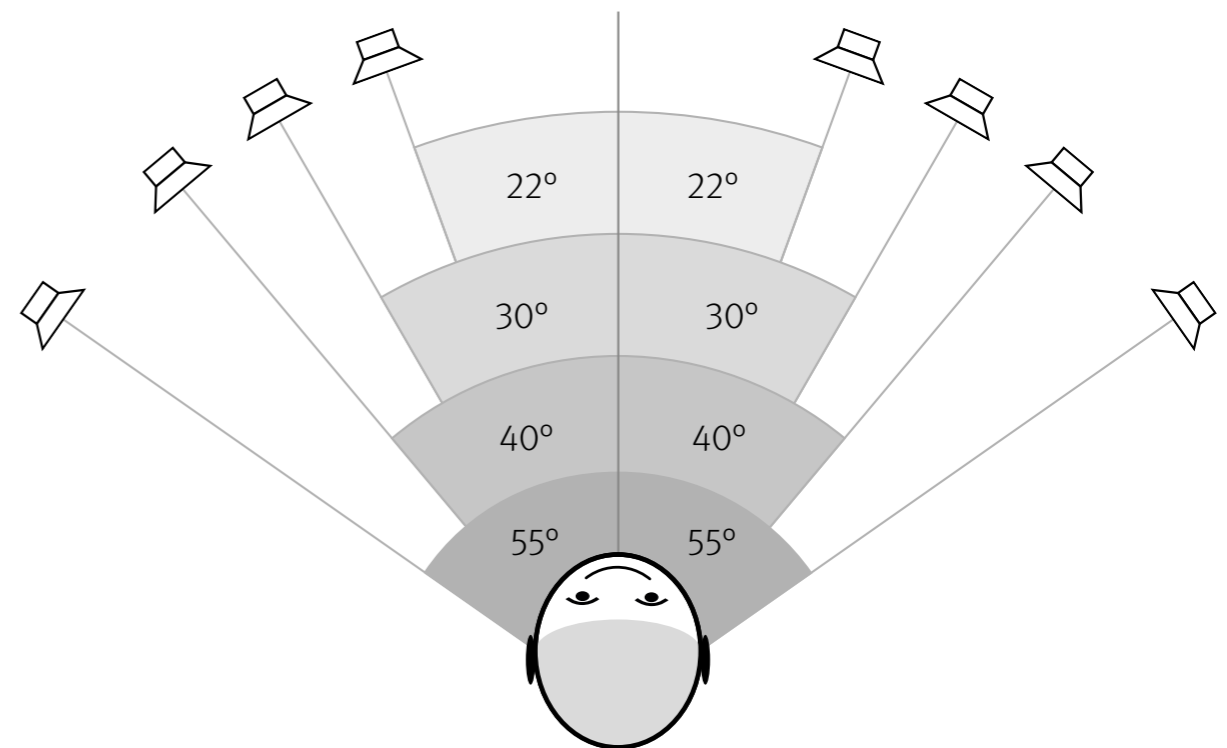
## In Detail

An analog filter design creates interaural time and level differences for four different speaker placements.

This analog filter design is controlled by the crossfeed and angle parameters.

## Angle

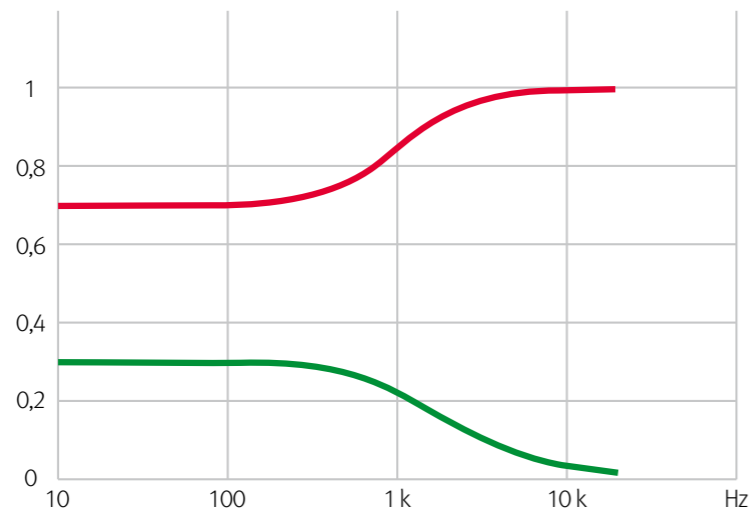
With the ANGLE switch you adjust the interaural time difference which is related to the placement of the speakers.



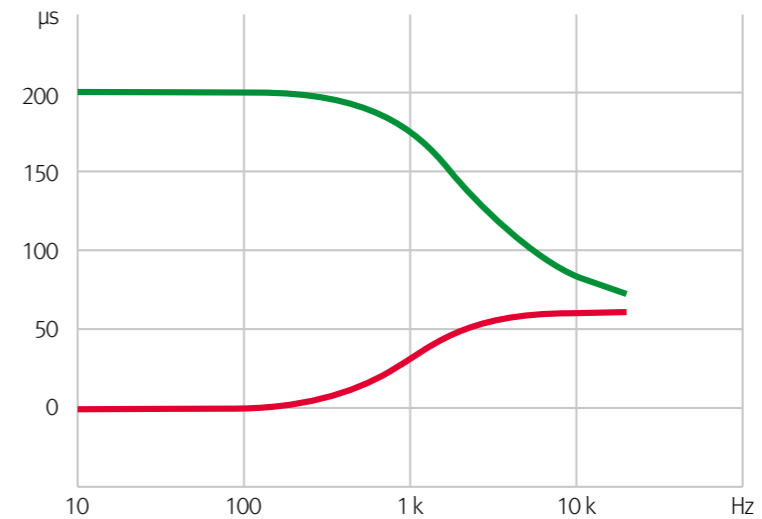
# Crossfeed

Crossfeed defines the interaural level difference. The six crossfeed values approximate the influences of room size, reflection and absorption characteristics.

Frequency corrected level difference at max. Crossfeed and 30° Angle of the right channel (red = right signal, green = left signal)



Frequency corrected time difference at max. Crossfeed and 30° Angle of the right channel (red = right signal, green = left signal)



The interaural level difference and the interaural time difference are frequency-corrected because the sound is reflected and absorbed by the head in a non-linear fashion.

## Setting of Crossfeed and Angle

Both parameters (Crossfeed and Angle) define the interaural level difference and the interaural time difference. To reproduce the exact placement of the loudspeakers, first choose the Angle parameter closest to your real speaker placement. Afterwards choose the recommended Crossfeed Parameter (see table on [page 17](#), e.g.: Angle: 30°, Crossfeed: 3).

A vast number of factors, e.g. type of loudspeakers, room acoustics or the individual perception, influence the stereo-listening. This is why the Phonitor x offers six different switch positions to finely adjust the Crossfeed and to best match to your speaker playback.

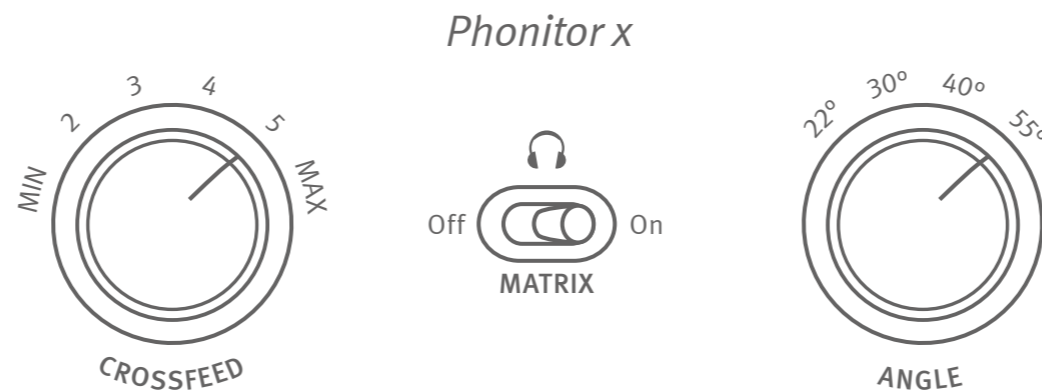




Table: Settings of Crossfeed and Angle

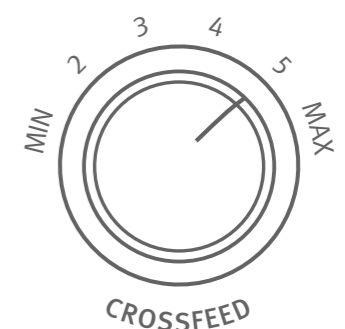
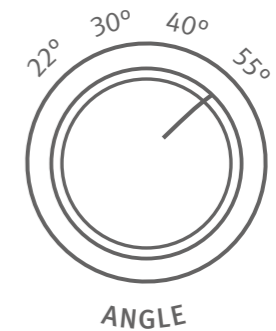
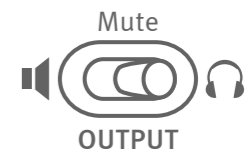
Angle parameter	Crossfeed parameter	Interaural level difference	Interaural time difference ( $\mu$ s)	Speaker angle
22°	MAX	0,24	133	15°
	5	0,35	165	20°
	4	0,40	210	20°
	3	0,47	220	25°
	2	0,50	230	25°
	MIN	0,60	250	30°
30°	MAX	0,40	205	20°
	5	0,49	235	25°
	4	0,56	260	30°
	3	0,64	280	30°
	2	0,70	300	30°
	MIN	0,76	335	40°
40°	MAX	0,26	290	30°
	5	0,34	355	40°
	4	0,40	400	45°
	3	0,49	455	45°
	2	0,50	480	55°
	MIN	0,60	535	70°
55°	MAX	0,34	350	40°
	5	0,44	405	45°
	4	0,50	450	50°
	3	0,58	490	55°
	2	0,52	525	65°
	MIN	0,70	555	70°

## Adjustment of the Phonitor Matrix

By using the [CROSSFEED switch \(4\)](#) and the [ANGLE switch \(5\)](#) you can adjust the headphone playback through the Phonitor x to your room with your loudspeaker setup.

- Play some audio material you know well with the Phonitor x and go to a place where you usually listen to music through speakers.
- Toggle between headphones and loudspeakers by using the OUTPUT switch (11).
- Set the ANGLE switch according to your loudspeaker placement (see [page 14](#)).
- Then set the CROSSFEED switch to the value that comes closest to your familiar loudspeaker-listening sound.

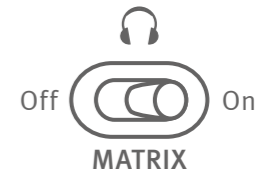
Listen to the instruments panned in the stereo field. These instruments shall have the same positions on headphones.



## Matrix On/Off

With the [MATRIX switch \(3\)](#) you activate or deactivate the Matrix of the Phonitor x.

The Phonitor Matrix is available for headphone outputs only. The [Speaker Outputs \(19\)](#) at the rear of the unit are not fed by the Phonitor x matrix.



# Source selection

The Phonitor x is not just a headphone amplifier. It is also a preamplifier with up to five audio sources.

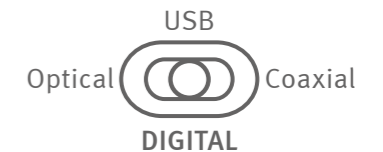
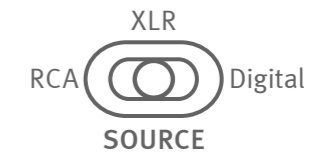
It features two analog stereo inputs – [XLR and RCA \(15\)](#).

Phonitor x can be equipped with a DA converter. With that installed the available inputs are expanded by [USB, coaxial and optical digital stereo inputs \(16\)](#).

- Select an analog audio source by using the [SOURCE switch \(8\)](#) – RCA or XLR.
- You can select an digital audio source (USB, coaxial, optical) by using the [DIGITAL switch \(9\)](#).

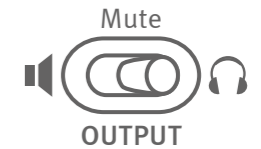
Set the SOURCE switch to Digital.

Signals at analog RCA input (12), will be amplified from HiFi level to studio level. The sources are then equal in level when you switch between XLR and RCA (provided that a studio signal is present at the XLR input).



# Output selection

With the [OUTPUT switch \(11\)](#) you send an input signal to a selected output – Loudspeakers or headphones.



In the Mute position no signal passes through to the outputs. The VU meter are illuminated in red.

Set to the loudspeaker setting, the selected input signal passes through to both analog audio outputs – RCA and XLR.

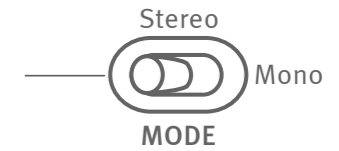
Please note that the [standard headphone output \(13\)](#) takes priority over the [balanced headphone output \(12\)](#). There is no signal at the balanced headphone output if a headphone is already plugged into the standard headphone output.

To protect the headphone power amplifier stage and guarantee a long and consistent performance please note:

- Turn down VOLUME before swapping headphones.
- Never insert a mono jack plug into the front panel stereo jack.
- Make sure that the headphones stereo jack is fully inserted.
- If you use an adapter from 3,5 mm to 1/4" (6,35 mm) on your headphone make sure that the adapter is fully screwed on respectively fully plugged in.

## MODE switch

By using the [MODE switch \(10\)](#) you can switch the audio signal to Stereo, Stereo with Laterality control and Mono. In Mono mode, both stereo channels are summed. The mono signal maintains the same loudness, because both stereo channels are each reduced by 6 dB.



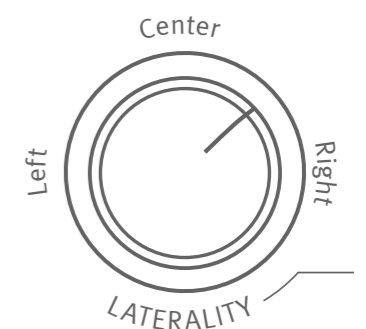
## Laterality

Laterality refers to the deviation of sound perception to either side of the ears. With the [Laterality control \(6\)](#) you can compensate perceived volume differences between channels that may be due to a hearing impairment.

This control differs from conventional balance controls. If one channel is attenuated, the other one is increased at the same time. This means that, e.g. when hard left, the level of the left channel increases by 2.25 dB while the right channel is attenuated by 2.25 dB.

This control has a narrower range than conventional balance controls. Its resolution is very fine, which means it can be precisely adjusted.

Set the MODE switch to LATERALITY to control the laterality (see above).



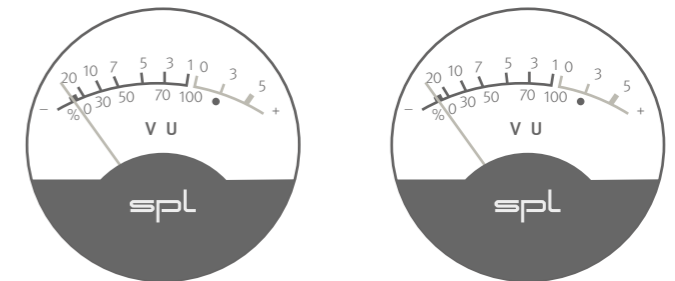
# VU meters

The [VU meters \(2\)](#) display the input levels for the selected source. The meter indicates levels from -20 dB to +5 dB. 0 dB corresponds to +4 dBu.

If necessary you can lower the sensitivity by 10 dB so that the meters go up to +15 dB input level (see ["DIP switches" on page 27](#)).

The ballistics of the VU meters guarantee an optimal visual perception. The time calibration of the VU meters complies with the requirements of the BBC. The rise time up to 0 dB is about 300 ms.

If the VU meters light up red permanently – even if the Phonitor x is unmuted – the protection circuit has been activated. The output connectors are disconnected from the amplifier via a relay to protect the connected headphones. Please contact your local dealer for repair service.

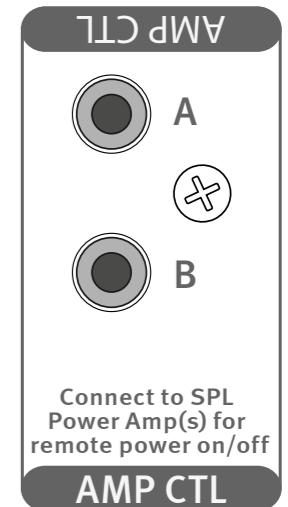


# AMP CTL (Amplifier Control)

If you own a SPL Performer s800 you can connect the [AMP CTL \(18\)](#) of the Phonitor x with a mono mini jack cable to the AMP CTL of the Performer s800 to switch both units in and out of standby together. Use a 3.5 mm mono mini jack cable.

The Phonitor x offers two outputs (A and B) in case you use two Performer s800 in bridge mode or in a bi-wiring application.

Set the DIP switch 6 on the bottom of the unit to ON to switch the Performer s800 into standby when the output selection is set to Headphone (see ["Standby of connected Performer s800 power amp when set to Headphone" on page 28](#)).



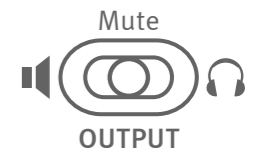


# IR Remote control

The volume potentiometer can be remotely controlled using any infrared (IR) remote control.

The special feature is that the Phonitor x learns your remote and not the other way around. You do not need a universal remote control. Take, for example, the remote control of the CD player. Out of the many buttons there are two you hardly use if at all. Assign Volume up / Volume down to these two buttons and let the Phonitor x learn them.

- While learning the IR remote control commands set the OUTPUT switch (11) to Mute. VU meters light up red.
- Press the [PGM IR VOLUME button \(17\)](#) on the rear of the unit until you note the actuation point. The Power LED now lights up brighter.
- Point your remote control towards the [VU meters \(2\)](#) and push the button you wish to use to **lower the volume**. The power LED flashes once per push. Press the same button repeatedly until the power LED flashes three times within a short interval – programming this button is then completed.



- Point your remote control towards the [VU meters \(2\)](#) and push the button you wish to use to **increase the volume**. The power LED flashes once per push. Press the same button repeatedly until the power LED flashes three times within a short interval – programming this button is then completed.
- Learn mode ends automatically after the second button is learned.
- Please note: direct insolation of strong light (e.g. sun light, halogen lamps, neon tubes, fluorescent tubes, terrarium and aquarium lights as well as big flat screens) may lead to misoperation of the remote control functions.

# DIP switches

With the [DIP switches \(20\)](#) on the bottom of the unit the following settings can be chosen:

## Level increase of the headphone output

By using the DIP switches 1 and 2 you can increase the level of the headphone outputs to better feed power-hungry headphones.

DIP switch 1: ON = The headphone output is boosted to +22 dB.

DIP switch 2: ON = The headphone output is boosted to +12 dB.

DIP switch 1 and 2: ON = If both DIP switches 1 and 2 are ON, a boost of +24 dB is applied.

## Attenuate the sensitivity of the VU meters

With DIP switch 3 you can attenuate the sensitivity of the VU meter by 10 dB. With the switch activated, a value of +15 dB input level can be displayed.

DIP switch 3: ON = The sensitivity of the VU meter is attenuated by 10 dB. In this case 0 dB on the VU meter represent a value of +10 dBu.

## Slave Thru

By using DIP switches 4 and 5 the chosen input passes directly to the outputs.

DIP switch 4: ON = The chosen input passes directly to the XLR output without being affected by the volume control. (Slave Thru).

DIP switch 5: ON = The chosen input passes directly to the RCA output without being affected by the volume control. (Slave Thru).

## Standby of connected Performer s800 power amp when set to Headphone

By using the DIP switch 6 units which are connected to AMP CTL ( Performer s800 power amp) are set to standby to save power when the output selection is set to Headphone.

DIP switch 6: ON = Units which are connected to AMP CTL ( Performer s800 power amp) are switched into standby to save power when the output selection is set to .

# Specifications

## Inputs

### XLR inputs

- Neutrik XLR, balanced, Pin 2 = (+)
- Impedance: ca. 20 kohms
- CMR: -82 dBu (at 1 kHz)
- Max. Input level: +32.5 dBu

### RCA inputs

- Unbalanced
- Impedance: ca. 10 kohms
- Max. Input level: +32.5 dBu

### Digital inputs (optional DAC192 - 1670, until 2019) / sample rates

- Coaxial SPDIF (RCA) - sample rates PCM (kHz): 44.1, 48 , 88.2, 96, 176.4, 192
- Optical TOSLINK (F06) – sample rates PCM (kHz): 44.1, 48 , 88.2, 96
- USB (B) – sample rates PCM (kHz): 44.1, 48 , 88.2, 96, 176.4, 192

## Digital inputs (optional DAC 768xs - 1850, from 2019) / sample rates

- Coaxial SPDIF (RCA) - sample rates PCM (kHz): 44.1, 48 , 88.2, 96, 176.4, 192
- Optical TOSLINK (F06) – sample rates PCM (kHz): 44.1, 48 , 88.2, 96
- USB (B) – Encoded PCM (kHz): 44.1, 48 , 88.2, 96, 176.4, 192, 352.8, 384, 705.6, 768  
DSD: DSD1 (DSD64), DSD2 (DSD128), DSD4 (DSD256)

## Outputs

### Balanced headphone output

- Neutrik 4-pin XLR connector
- Pin wiring: 1 = L (+), 2 = L (-), 3 = R (+), 4 = R (-)
- Impedance: 0.36 ohms
- Damping factor: 180 @ 40 ohms
- Frequency range: 10 Hz to 300 kHz ( -3 dB)
- Crosstalk at 1 kHz: -90 dB
- THD & N: 0.00091 % (at 0 dBu, 1 kHz, 100 kohms load)
- Noise (A-weighted): -98 dBu
- Dynamic range: 130.5 dB

## Standard headphone output



Warning: Never connect a mono jack cable to the standard headphone output (front panel stereo jack). Make sure that the stereo jack is fully inserted, otherwise a short circuit might damage the headphone amplifier!

- 6.35 mm TRS connector
- Pin wiring: Tip = Left, ring = right, sleeve = GND
- Impedance: 0.18 ohm
- Attenuation factor: 180 @ 40 ohms
- Frequency range: 10 Hz to 300 kHz ( -3 dB)
- Crosstalk at 1 kHz: -90 dB
- THD & N: 0.00091% (at 0 dBu, 1 kHz, 100 kohms load)
- Noise (A-weighted): -103 dB
- Dynamic range: 135.5 dB

## Max. Output power (at +30 dBu @ 1 kHz)

- 2 x 1 W at 600 Ohm impedance
- 2 x 2 W at 300 Ohm impedance
- 2x 3.7 W at 120 Ohm impedance
- 2x 2.9 W at 47 Ohm impedance
- 2x 2.7 W at 32 Ohm impedance

## Line outputs

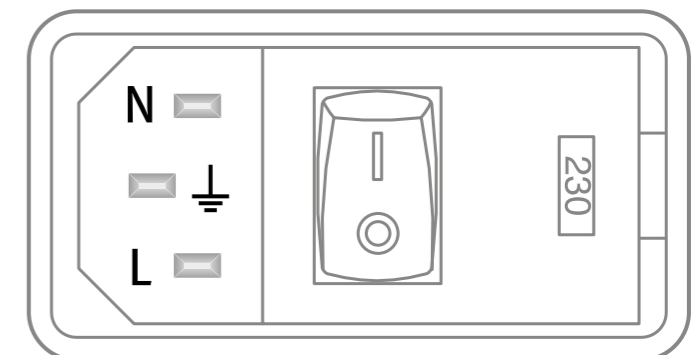
- Neutrik XLR, balanced, Pin 2 = (+)
- RCA, unbalanced
- Frequency range: 4 Hz to 300 kHz (-3 dB)
- Crosstalk at 1 kHz: -106 dB
- THD & N: 0.00085 % (at 0 dBu, 1 kHz, 100 kohms load)
- Noise (A-weighted): -103.8 dB
- Dynamic range: 136.3 dB

## Internal operating voltages

- Analog: +/- 60 V
- Digital: + 5 V and + 3.3 V (optional)

## Power supply

- Mains voltage (switchable): 230 V AC / 50 Hz or 115 V AC / 60 Hz
- Fuses: 230 V: T 500 mA; 115 V: T 1 A
- Power consumption: max 40 VA
- Stand-by power consumption: 0.7 W





## Dimensions (incl. feet)

- (WxHxD) 10.94 x 3.94 x 12.99 in (278 x 100 x 330 mm)

## Weight

- 9.48 lbs (4.3 kg), unit only
- 11.90 lbs (5.4 kg), shipping

# Important Notes


Version 1.6 – 03 /2020

Developer: 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 by SPL electronics GmbH. The design and circuitry are under continuous development and improvement. Technical specifications are subject to change.

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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.