Series 7

soulution
nature of sound

760 D/A-converter

User manual

Dear client

We are proud that you decided to go for a soulution product. You have acquired a product with outstanding sonic performance which you will enjoy for many years.

We understand your eagerness to get started but even though please study this manual step by step before you integrate the 760 D/A-converter in your High Fidelity system. This manual contains also useful tips for the optimisation of your overall HiFi-system.

If there are any questions regarding the start-up or operation of your 760 D/A-converter please do not hesitate to contact your dealer.

Enjoy!

your soulution Team

CE-Declaration of Conformity

Spemot AG declares that this product is in conformance with the following directives and standards:

Low Voltage Directive 2006/95/EG (EN/IEC 60065:2002)

Electromagnetic Compatibility 2004/108/EG (EN 55013:2001, EN 55020:2002, EN 61000-3-2:2006, EN61000-3-3:1995)

FCC-Notice

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- ⇨ adjust or relocate the receiving antenna
- ⇨ increase the separation between the equipment and the receiver
- ⇨ connect the equipment into a mains outlet on a circuit different from that to which the receiver is connected
- ⇨ consult the dealer or an experienced radio/TV technician for help

Disposal

According to the Directive 2002/96/EG of the European Parliament used consumer-electro technical appliances have to be disposed separately and have to be indicated with the following symbol.

In the case of disposal of this component please do so in conformity with legal and environmental regulations.

Table of content

Quick start

Unpacking	⇨ Unpack the 760 D/A-converter ⇨ Store the packing for future transportations ⚠ Treat the top class surface with care.
Positioning	⇨ Position the 760 D/A-converter on a stable base. ⚠ Cooling air must be able to escape unrestrictedly.
Cabling	⇨ Disconnect all components of your setup from the mains ⇨ Connect the 760 with your (pre)amplifier ⇨ Connect the 760 with your digital source components ⇨ Reconnect all components with the mains ⚠ While manipulating with cables the 760 D/A-converter has to remain disconnected from the mains.
Programming	⇨ Default values for all functions are programmed. ⇨ No additional settings are required.
Switch on	⇨ Switch on the 760 D/A-converter ⇨ Select moderate volume level ⇨ Switch on the source components and your (pre)amplifier ⚠ Check the cabling before you switch on.

1 Highlights

1.1 DSP (Digital Signal Processor)

A powerful DSP performs the calculations for the upsampling to 24Bit, 352.8kHz (or 384kHz). The DSD data of a SACD is converted into PCM format during the up-sampling process. The converted data is extrapolated by a polynomial algorithm. Additionally this DSP performs computations for the volume control and the balance settings. Thanks to its 32Bit floating comma architecture these calculations go without the usually increase of the quantification noise.

1.2 zero φ tech

The soulution 760 D/A-converter incorporates the unique and innovative, DSP based Zero-Phase-Technology. Every digital to analog converter requires an analog low pass filter in its output in order to suppress high frequency noise and aliasing signals, which adds phase shifts for higher frequencies. Despite its relatively high cut-off frequency of 120kHz, the analog 3rd order Bessel-filter of the 760 shows a phase shift of up to 15° in the audio band. A powerful DSP does pre-correct these potential phase errors in the digital signal. Once the signal passes the D/A converter stages and its related low pass filter these errors get cancelled out. The phase error of the resulting analog music signal remains below 1°, 20Hz - 100kHz! The Zero-Phase-Technology brings you even closer to the beauty of the source material!

1.3 Clock

Utmost precision of the clock signal is a must have for a top class D/A-converter. Lowest phase-noise behaviour is by far more important than long term frequency stability. Together with experts in the field of highend oscillators we did develop a TCXO which is optimized for this application. It does not run on its first harmonic but on its 3rd overtone. The clock modules work at frequencies around 100MHz, this requires extremely fast amplifier stages within the oscillator loop but allows achieving best results regarding phase-noise. Even the best OCXOs or rubidium based oscillators are not able to outperform these specifications. The 760 DAC does have a separate oscillator module for signals based on 44.1kHz and signals based on 48kHz.

Synchronisation to an external clock signal would deteriorate the performance of these oscillator modules significantly. Therefore the 760 does not provide any clock-input. However, external components can be synchronised to the high quality clock signal through its clock-output.

1.4 Digital/Analog-Converter

The D/A converter section as well as the analog output stages are done in dual mono layout. Only the top quality converter section of the Burr-Brown 1792 DAC chip is used. The internal upsampling section is bypassed! Four extremely fast (80MHz) I-V converters per channel transform the output sensible currents of the DAC chips in voltages before they get filtered in the following stage. This ensures optimal conditions in the filter stage as well as for the I-V converters.

1.5 Output stage

The output stage is optimised for velocity, precision and impulse current rating. It works with an internal bandwidth of more than 40Mhz. Thanks to its low output impedance of 2Ω and Class-A operation the output stage is stable on every load (also long cables are driven without problems). Its theoretical peak current rating of 3A is limited to 1A.

1.6 Power Supply

The 760 D/A-converter has two strictly separated power supply units for the digital and analogue sections of the unit. This ensures lowest mutual interferences between these two sections. The supply voltages for the analog section are stabilised in several stages for minimal deviations. More than 500'000 microFarad of storage capacitance combined with extremely fast and precise voltage control stages ensure optimal current peak ratings.

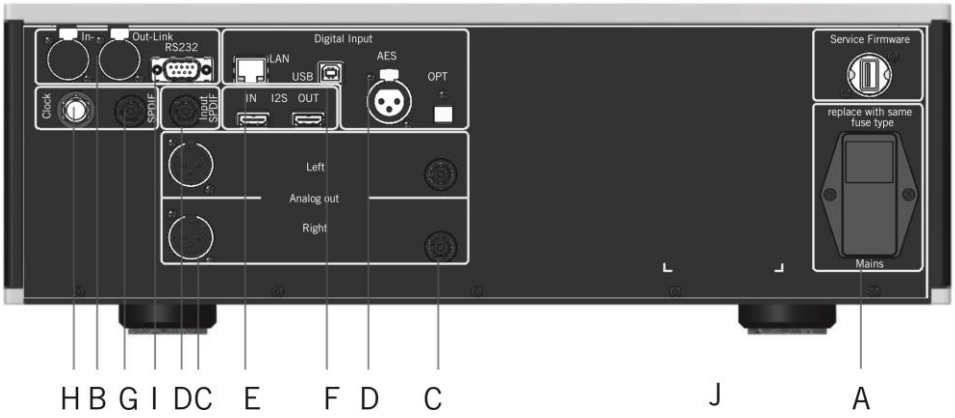
2 Safety advice: ⚠

User manual	⇨ Follow the safety advices ⇨ Keep this user manual.
Mains supply	Exclusively use 3 phase power cords with ground conductor. Unplug the 760 from the mains in the following cases: ⇨ before you manipulate with cables ⇨ before cleaning ⇨ during thunder storms ⇨ before you leave for longer periods
Cabling	While manipulating with cables the 760 has to remain disconnected from the mains. Wrong cabling may cause damages to your 760, (pre)amplifier and loudspeakers. Excessive volumes due to inappropriate handling may cause hearing damages.
Transport	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 cart/apparatus combination to avoid injury or tip over.
Packing	In order to omit condensation of water inside your 760, let it warm up within the packing. Please keep the original packing for future transports.
Operation	Never run your 760 ⇨ with opened housing ⇨ with closed cooling-slots ⇨ with high ambient temperatures (>40°C) ⇨ close to heat sources like radiators, etc. ⇨ with extremely high humidity for example in humid cellars ⇨ close to water (Sink, bathtub, or similar equipment)
Cleaning	Use a soft and dry towel. We suggest using a nonabrasive microfiber towel. Please do not use any solvents or liquidities
Service	Service by a qualified person required if ⇨ the mains-cable or the mains connectors are damaged ⇨ foreign substances or liquidity have entered the 760 ⇨ the 760 has seen rain ⇨ the 760 seems to malfunction ⇨ the 760 has fallen to the floor or the housing is damaged

3 Scope of delivery

- ⇨ 760 D/A-converter
- ⇨ USB-Stick (with „soulution USB Audio ASIO“ driver for Windows)
- ⇨ Remote control
- ⇨ Power cord
- ⇨ User manual

4 Rear panel



4.1 Mains (A)

Connect the 760 D/A-converter with the mains supply. In standby the 760 has a power consumption of <0.5W (red LEDs in display).

⚠ Only switch-off the mains if your 760 D/A-converter is in standby.

4.2 LINK (B)

Connect the LINK-In of the 760 D/A-converter with the LINK-Out of your soulution preamplifier. LINK-Out allows including further components in the LINK-network.

4.3 Output (C)

Due to the extraordinary load-stability of the output-stage also long cables can be used with no reduction of sound quality. For long cables we recommend using the balanced connectors. For short cable lengths also unbalanced cables represent a high quality connection, top quality cable and optimal layout prerequisite.

4.4 Digital-Input (D)

The 760 D/A-converter has three digital input connectors (SPDIF, AES/EBU and Toslink). Digital data (PCM) up until 24Bit, 192kHz can be received.

4.5 LAN (E)

The 760 D/A-converter can receive digital audio data from your local area network. It will be seen by media servers as „UPnP™ AV/DLNA Media Renderer device".

Following file formats are supported:

File format	Bit depth	Sampling rate
FLAC (Free Losless Audio Codec)	16-24 bit	44.1 – 192 kHz
WAV (Waveform Audio File Format)	16-24 bit	44.1 – 192 kHz
MP3 (Mpeg Audio Layer 3)	16-24 bit	44.1 – 192 kHz
ALAC (Apple Lossless Audio Codec)	16-24 bit	44.1 – 192 kHz
AAC (Advanced Audio Coding)	16-24 bit	44.1 – 192 kHz
AIFF (Audio Interchange File Format)	16-24 bit	44.1 – 192 kHz
DSF and DFF (DSD stream file)	1 bit	2.82 – 5.64 MHz
DXD (Digital eXtreme Definition)	24 bit	352.8 kHz

4.6 USB Audio (F)

The readable file formats depend mainly on the used player software. The following formats can be received by the 760 D/A-converter:

File format	Bit depth	Sampling rate
PCM (WAV, AIFF, FLAC; etc.)	16 - 24 bit	32 – 192 kHz
DSD (DoP)	1 bit	2.82 – 5.64 MHz

The 760 D/A-converter supports USB Audio Class 2.0. For operating systems such as Mac OS X, the 760 supports driver free playback up to 24bits/192kHz. Under Windows a specific USB Audio Class 2.0 driver is required for playback of files with sampling rates > 96kHz. Download www.soulution-audio.com

4.7 Digital-Output (G)

Digital data are bypassed unprocessed to the digital output (RCA).

4.8 Clock-Output (H)

The clock may be used for the synchronisation of other components.

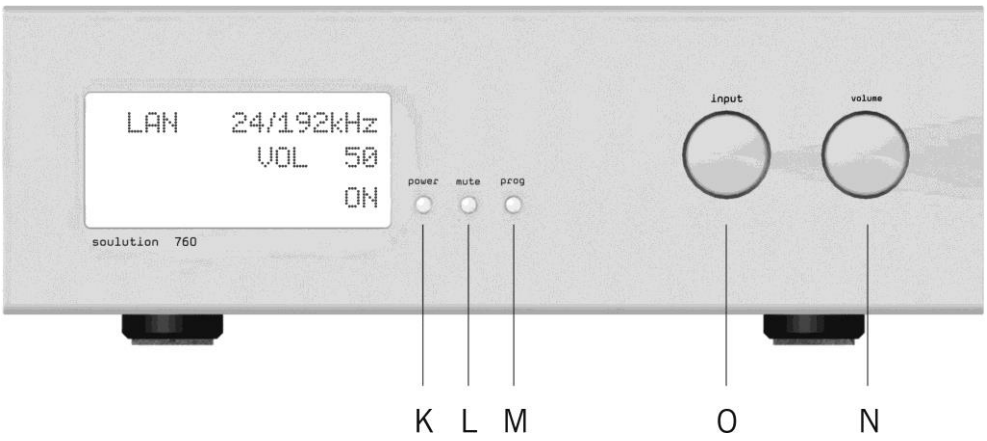
4.9 RS 232 Interface (I)

The 760 D/A-converter can be remote controlled through the RS232 interface. All functions can be controlled and relevant information is provided to the control unit.

4.10 Type label (J)

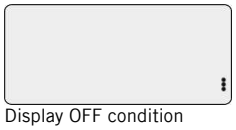
The type label shows the serial number and the nominal power consumption.

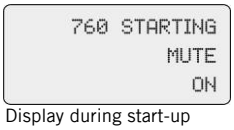
5 Front panel



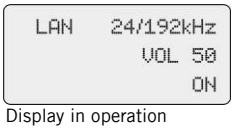
5.1 Power (K)

The Power-button defines the operating condition ON or OFF (red LEDs). The audio circuits remain disconnected from the outputs until it is switched on.


Display OFF condition



Display during start-up

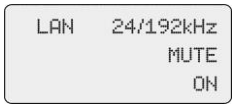


Display in operation

We suggest switching the 760 D/A-converter to standby (OFF) while not listening to music. (Power consumption <0.5 W).

⚠ Unplug the 760 D/A-converter from the mains before you manipulate with cables, before cleaning, during thunder storms or before you leave for longer periods.

5.2 Mute (L)



Mute allows disconnecting all outputs in case of an emergency

5.3 Prog (M)

The 760 D/A-converter can be adjusted to specific requirements of your system.
The Prog-button (de)activates the Program-Mode.

5.4 Volume (N)

The volume function is only available if the „Volume Mode“ is activated (program functions).

Volume +/-

0	=	Mute	- ∞ dB
1	=	min. Volume	-79 dB
80	=	max. Volume	0 dB

We suggest limiting the volume (Volume-Max function)

Volume-Dim
Pushing the Volume-knob (de)activates the Volume-Dim function (Display for example „D 10“).As long as the Volume-Dim function is active the volume cannot be altered by the Volume-knob.

5.5 Input (O)

Input Select
Selects the inputs

6 Program-Mode

6.1 Overview

Several Program-Functions allow adjusting the 760 D/A-converter to your individual High-Fidelity setup.

Push on the Prog button switches between operating-mode and Program-Mode. Timeout after 10 seconds.

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Rotating of the Select knob allows selecting the desired Program-Function

Push on the Select knob for approval of the selected function. Now the value domain of the selected Program-Function is active. (red LEDs in display).

Rotating of the Select knob allows for adjusting the desired value.

Push on the Select knob for approval of the respective value.

6.2 Program-Functions

Function	Values	Remarks
VOLUME MODE ON PROGRAM:	**ON,** OFF	(De)activates the Volume-Mode.
START VOLUME 35 PROGRAM:	1..**30**..50	Defines the Start-Volume level. In the value domain it changes to the Start-Volume level.
MAX VOLUME 60 PROGRAM:	50...**80**	The maximal volume can be limited. In the value domain the volume level does not change.
BALANCE -> 2 PROGRAM:	<- 9...**0**...9 ->	Defines the level difference between left and right channel.
START-MODE LINK PROGRAM:	**NORM**, LINK	NORM ⇨ OFF (Standby) LINK ⇨ Depending on Link System
START-INPUT SPDIF PROGRAM:	**SPDIF**,AES/EBU, Optical, USB, Ethernet	Defines which input shall be active after start-up.
DIGITAL-OUTPUT ON PROGRAM:	**OFF,** ON	(De)activates the digital outputs
BRIGHTNESS 3 PROGRAM:	1 = low 2 = medium **3 = high**	Adjusts the brightness of the display
LOAD-DEFAULT YES PROGRAM:		Loads the default values **(bold)** for all functions.

7 Remote control

Button	Pre/DAC-Mode	CD-Mode
(1) IR-transmitter	Operation until 5m distance and angel of ±45°.	
(2,3) ▲ ▼	Volume +/-	
(4) DIM / ⏵⏸	Volume-Dim	Play/Pause
(5/6) ◀ ▶	Select +/-	Next / Previous track
(7) ↵	Enter Function for Program-Mode	
(8) P	(De)activates Program-Mode	
(9) 🔇	Mute	-
(10) ⏻	ON / OFF	
(11) ⏏	-	Open/Close
(12) PRE	-	Activates Pre/DAC-Mode
(13) CD	Activates CD-Mode	-

Change of Remote Ctrl ID:
Bring the remote control in PRE-mode and
press the respective buttons for approx. 5 seconds.

- ⇨ Preamplifier ID 1: ◀ (6), ▶ (5), ⏻ (10)
- ⇨ Preamplifier ID 2: ◀ (6), ▶ (5), 🔇 (9)
- ⇨ Phono ◀ (6), ▶ (5), ↵ (7)
- ⇨ DAC ◀ (6), ▶ (5), P (8)

Exchange of batteries (2 x AAA):

- ⇨ Open the battery tray on the rear side.
- ⇨ Insert the batteries into the tray as indicated.
- ⇨ Ensure correct polarity of the batteries.
- ⇨ Close the tray with corresponding screw.
- ⇨ Dispose the exhausted batteries

8 Trouble shooting

Error	Action
No display	Check the cabling to the mains supply. Eventually replace the fuse.
No music	Check ⇨ the cabling to your sources and the (pre)amplifier. ⇨ if the proper input has been selected ⇨ if the source component is in MUTE ⇨ if the (pre)amplifier is switched on
POWER FAIL	In case of a short circuit in the power supply the unit switches off automatically. The display shows POWERFAIL.
OVERCURRENT	If the current at the output is higher than 1A the MUTE function is activated and the display shows OVERCURRENT.

If you cannot identify the error please disconnect the 760 D/A-converter from the mains supply and contact your soulution dealer.

9 Service

If your soulution product needs service please contact your soulution dealer. For further information see www.soulution-audio.com

10 Safety functions

Overcurrent	For currents > 1 A at the output the 760 D/A-converter shuts down automatically.	
Power supply	The power supply is monitored for correct operation. In case of an error the 760 gets shut down automatically.	
Fuse	Model 220-240 V	2A/T 250V micro fuse 5x20mm
	Model 100-120 V	4A/T 250V micro fuse 5x20mm

11 Warranty

All soulution products are guaranteed against defects in material and workmanship for five years from date of purchase.

The guarantee is void if the product has been subject to misuse or negligence or has been modified, repaired or opened by a non-authorised person without written authorisation of Spemot AG.

For the return transport to our premises please use exclusively the original packaging. Transport damages are not subject to this guarantee, repairs will be charged. We recommend effecting transport insurance.

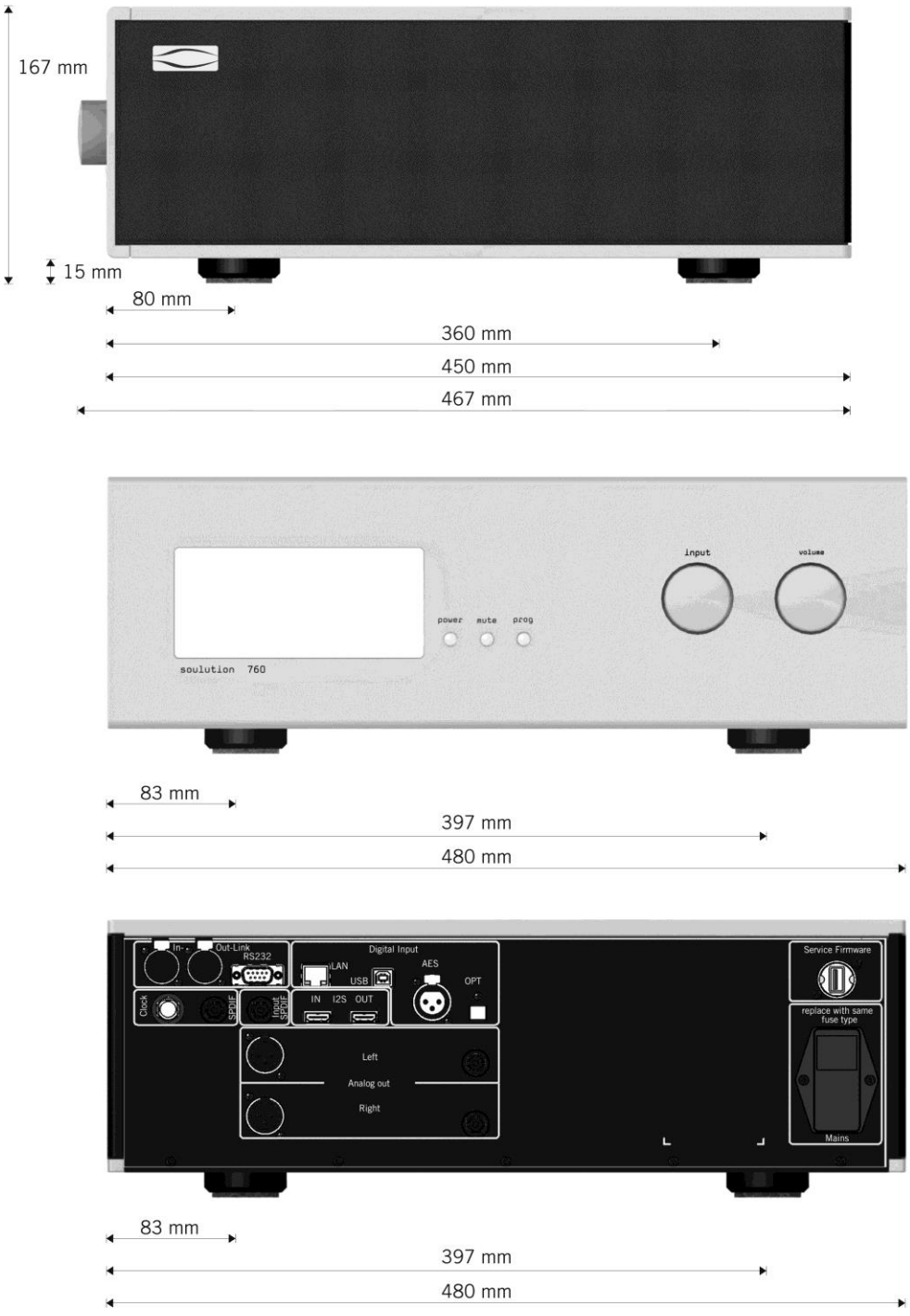
If you do not have the original packaging no more please contact your soulution dealer.

Basic repairs may be completed by your soulution dealer. Please clarify whether he is able to do the work before you send the product back to us.

12 Specification

Nominal voltage		
Model 220 – 240 V / 50 – 60 Hz		220 – 240 V
Model 100 – 120 V / 50 - 60 Hz		100 – 120 V
Power consumption		
OFF (standby)		<0.5 W
ON		60 W
Main-Out		
Output voltage	Balanced (XLR)	4 Vrms
	Unbalanced (RCA)	2 Vrms
Peak Output Current		1 A
Impedance		2 Ω
Frequency response		DC-100 kHz
Distortion (THD)		<0.0002 %
Signal to Noise Ratio		140 dB
Volume range		0...- 79 dB
Balance range		<- 9...0...9 -> dB
Digital-Out		
Output-Voltage	SPDIF	500 mV p-p
Output-Impedance	SPDIF	75 Ω
Digital-In		
Sensitivity		0.3 - 5 V p-p
Input-Impedance	SPDIF	75 Ω
	AES/EBU	110 Ω
PLL – control range		+/- 100 ppm
USB		
Input voltage		0.4 – 2.5 V
Data		24 bit / 192 kHz
Ethernet		
Input voltage		0.4 – 2.5 V
Data		24 bit / 192 kHz
LINK-System		+12 V

13 Dimensions



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nature of sound

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