

# Series 5



## 560 D/A-Converter User manual





**Dear client**

We are proud that you decided yourself 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 560 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 560 D/A-Converter please do not hesitate to contact your dealer.

**Have fun!**



**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.



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## Quick start

<b>Unpacking</b>	<ul style="list-style-type: none"> <li>⇒ Unpack the 560 D/A-Converter</li> <li>⇒ Store the packing for future transportations</li> <li> Treat the top class surface with care.</li> </ul>
<b>Positioning</b>	<ul style="list-style-type: none"> <li>⇒ Position the 560 D/A-Converter on a stable base.</li> <li> Cooling air must be able to escape unrestricted.</li> </ul>
<b>Cabling</b>	<ul style="list-style-type: none"> <li>⇒ Disconnect all components of your setup from the mains</li> <li>⇒ Connect the 560 with your (pre)amplifier</li> <li>⇒ Connect the 560 with your digital source components</li> <li>⇒ Reconnect all components with the mains</li> <li> While manipulating with cables the 560 D/A-Converter has to remain disconnected from the mains.</li> </ul>
<b>Programming</b>	<ul style="list-style-type: none"> <li>⇒ Default values for all functions are programmed.</li> <li>⇒ No additional settings are required.</li> </ul>
<b>Switch on</b>	<ul style="list-style-type: none"> <li>⇒ Switch on the 560 D/A-Converter</li> <li>⇒ Select moderate volume at the (pre)amplifier of the 560</li> <li>⇒ Switch on the source components and your amplifier</li> <li> Check the cabling before you switch on.</li> </ul>



## 1 Highlights

### 1.1 Layout

The power supply units, as well as the digital circuits are strictly separated from the analog sections. The analog output section is realized in dual mono layout.

### 1.2 DSP (Digital Signal Processor)

A powerful DSP performs the calculations for the upsampling to 24Bit, 384kHz. The DSD data of a SACD is converted into PCM format during the upsampling process. The converted data is extrapolated by a 3<sup>rd</sup> order polynomial algorithm. Additionally this DSP performs computations for the volume control and the balance settings. Thanks to the 32Bit floating comma architecture of the DSP these calculations go without the usually increase of the quantification noise.

### 1.3 Digital/Analog-Converter

The D/A converter section as well as the analog output stages are done in dual mono layout, one board per audio channel (left/right). We use the Burr-Brown 1792 DAC which guarantees excellent performance. Only the top quality converter section which runs up to 384 kHz of the chip is used. The internal upsampling section is bypassed! Two extremely fast (3MHz) I-V converters per DAC transform the output 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.

### 1.4 zero $\phi$ tech

The soulution 560 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 3<sup>rd</sup> order Bessel-filter of the 560 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!

## 1.5 Clock and PLL (Phase Lock Loop)

Utmost precision of the clock signal is a must have for a top class D/A-Conversion. For the synchronisation to external digital data the clock/PLL must adapt itself very fast to eventual changes of the external data. This is done by a special digital clock circuit that allows synchronising its clock signal very fast and at the same time extremely precise to the incoming signal.

## 1.6 Output stage

The output stage is optimised for velocity, precision and impulse current rating. Thanks to its low output impedance of 10Ω and Class-A operation the output stage is stable on every load (also long cables are driven without problems). The output stage is a completely symmetrical design.

## 1.7 Power Supply

The 560 D/A-Converter has two strictly separated power supply units which are combined with a multistage filtering network for lowest mutual interferences.

The supply voltages for the analog section are stabilised in several stages for minimal deviations.



**Safety advice:** ⚠

<b>User manual</b>	<ul style="list-style-type: none"> <li>⇒ Follow the safety advices</li> <li>⇒ Keep this user manual.</li> </ul>
<b>Mains supply</b>	<p>Exclusively use 3 phase power cords with ground conductor. Unplug the 560 from the mains in the following cases:</p> <ul style="list-style-type: none"> <li>⇒ before you manipulate with cables</li> <li>⇒ before cleaning</li> <li>⇒ during thunder storms</li> <li>⇒ before you leave for longer periods</li> </ul>
<b>Cabling</b>	<p>While manipulating with cables the 560 has to remain disconnected from the mains. Wrong cabling may cause damages to your 560, amplifier and loudspeakers. Excessive volumes due to inappropriate handling may cause hearing damages.</p>
<b>Transport</b>	<p>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.</p>
<b>Packing</b>	<p>In order to omit condensation of water inside your 560 D/A-Converter, let it warm up within the packing. Please keep the original packing for future transports.</p>
<b>Operation</b>	<p>Never run your 560 D/A-Converter</p> <ul style="list-style-type: none"> <li>⇒ with opened housing</li> <li>⇒ with closed cooling-slots</li> <li>⇒ with high ambient temperatures (&gt;40°C)</li> <li>⇒ close to heat sources like radiators, etc.</li> <li>⇒ with extremely high humidity for example in humid cellars</li> <li>⇒ close to water (Sink, bathtub, or similar equipment)</li> </ul>
<b>Cleaning</b>	<p>Use a soft and dry towel. We suggest using a nonabrasive microfiber towel. Please do not use any solvents or liquidities</p>
<b>Service</b>	<p>Service by a qualified person required if</p> <ul style="list-style-type: none"> <li>⇒ the mains-cable or the mains connectors are damaged</li> <li>⇒ foreign substances or liquidity have entered the 560</li> <li>⇒ the 560 has seen rain</li> <li>⇒ the 560 seems to malfunction</li> <li>⇒ the 560 has fallen to the floor or the housing is damaged</li> </ul>

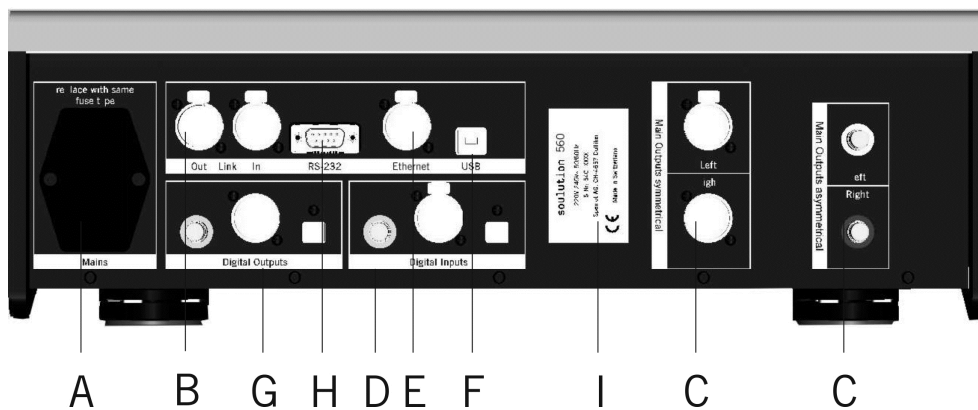




### 3 Scope of delivery

- ⇒ 560 D/A-Converter
- ⇒ USB-Stick (with „soulution USB Audio ASIO“ driver for Windows)
- ⇒ Remote control
- ⇒ Power cord
- ⇒ User manual

### 4 Rear panel



#### Mains (A)

Connect the 560 D/A-Converter with the mains supply. In standby the 560 has a power consumption of <0.5W (red LEDs in display).

⚠ Only switch-off the mains if your 560 D/A-Converter is in standby.

#### LINK (B)

Connect the LINK-In of the 560 D/A-Converter with the LINK-Out of your soulution preamplifier. LINK-Out allows including further components in the LINK-network.



## 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.

## Digital-Input (D)

The 560 D/A-Converter has three digital input connectors (SPDIF, AES/EBU and Toslink). Digital data (PCM) up until 24Bit, 192kHz can be received.

## LAN (E)

The 560 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 Lossless 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



## USB Audio (F)

The readable file formats depend mainly on the used player software. The following formats can be received by the 560 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
DXD	24 bit	352.8 kHz

The 560 D/A-Converter supports USB Audio Class 2.0. For operating systems such as Mac OS X, the 560 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.

## Digital-Output (G)

The 560 D/A-Converter has 3 digital output connectors. (SPDIF (RCA), AES/EBU, Toslink). Connect your favourite digital output with the digital input of your external D/A-Converter. With the program-function

### 4.1.1 RS 232 Interface (H)

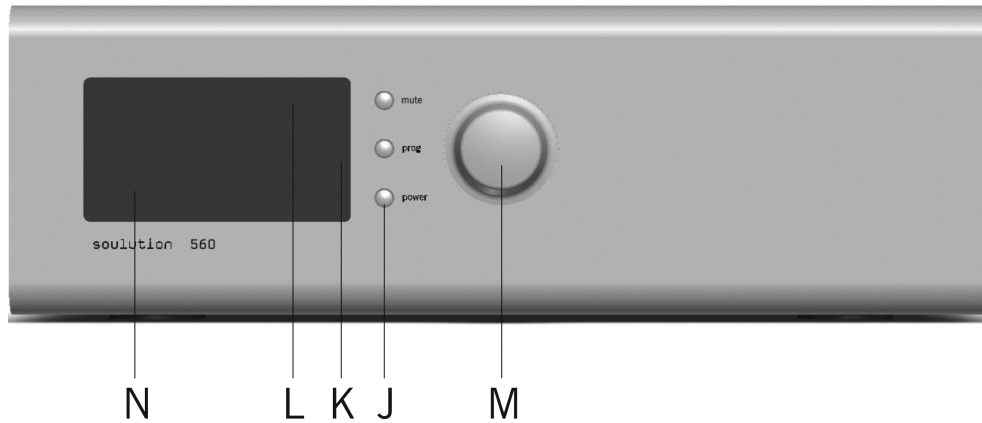
The 560 D/A-Converter can be remote controlled through the RS232 interface. All functions can be controlled and relevant information is provided to the control unit.

### 4.2 Type label (I)

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



## 4.3 Front panel

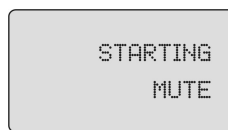


### 4.3.1 Power (J)

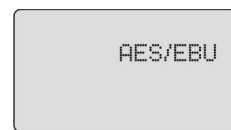
The Power-button defines the operating condition ON or OFF (red LEDs). The audio circuits remain disconnected from the outputs until it is switched on.



Display OFF condition



Display during start-up



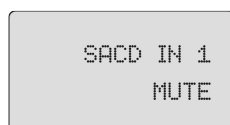
Display in operation

We suggest switching the 560 D/A-Converter to standby (OFF) while not listening to music. (Power consumption <0.5 W).



Unplug the 560 D/A-Converter from the mains before you manipulate with cables, before cleaning, during thunder storms or before you leave for longer periods.

### Mute (J)



Mute allows disconnecting all inputs from the outputs in case of an urgency (wrong cabling, feedback loops, etc.).

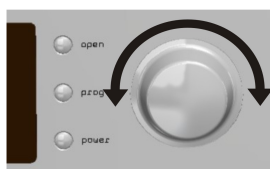


## Prog (K)

The 560 D/A-Converter can be adjusted to specific requirements of your system.  
The Prog-button (de)activates the Programming-Mode.

## Volume (L)

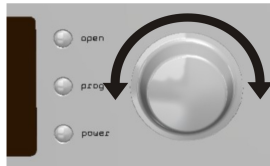
The Volume knob controls the functions Volume +/-, Input-Select and is used for the Programming.



Input +/-  
The desired input can be selected



Change to Volume mode



Volume +/-  
Volume control



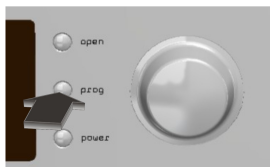
## 1 Program-Mode

### General

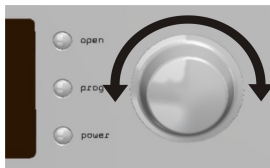
The 560 D/A-Converter can be adjusted to your individual setup. It is already programmed with default settings. Further programming is not mandatory.

We recommend to adjust the Start-Volume and to set the Max-Volume.

### Function



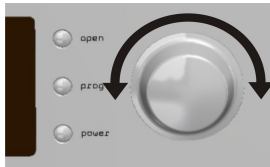
**Push** on the Prog button activates the Program-Mode. Timeout after 10 seconds.



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



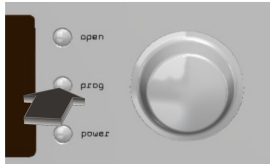
**Push** on the Select knob for approval of the selected function. Now the value domain of the selected Program-Function is active. (red LEDs in display).



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



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



**Push** on the Prog button deactivates the Program-Mode. Timeout after 10 seconds.



## 1.1 Program-Functions

Function	Values	Remarks
VOLUME-MODE ON :	ON, OFF	(De)activates the Volume-Mode.
START-VOLUME 35 :	1.. <b>30</b> ..50	Defines the Start-Volume level. In the value domain it changes to the Start-Volume level.
MAX-VOLUME 60 :	50.. <b>80</b>	The maximal volume can be limited. In the value domain the volume level does <u>not</u> change.
BALANCE <- 2 :	<- 9.. <b>0</b> ...9 ->	Defines the level difference between left and right channel.
START-MODE LINK :	NORM, LINK	NORM ⇒ OFF (Standby) LINK ⇒ Depending on Link System
START-INPUT IN 1 :	SPDIF, AES/EBU, Optical, USB, Ethernet	Defines which input shall be active after start-up.
DIGITAL-OUT ON :	OFF, ON	(De)activates the digital outputs
BRIGHTNESS 3 :	1 = low 2 = medium <b>3 = high</b>	Adjusts the brightness of the display
REMOTE-ID 2 :	1, 2	Defines the IR identification of the 560. The remote control has to be adjusted accordingly
LOAD-DEFAULT YES :		Loads the default values ( <b>bold</b> ) for all functions.



## 2 Remote control

Taste	Pre/DAC-Mode	CD-Mode
(1) IR-transmitter	Operation until 5m distance and angel of $\pm 45^\circ$ .	
(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-Mode
(13) CD	Activates CD-Mode	-

### Change of Remote Ctrl ID:

Press the respective buttons for approx. 5 seconds.

⇒ ID 1: ◀ (6), ▶ (5), ⏻ (10)

⇒ ID 2: ◀ (6), ▶ (5), 🔊 (9)

### 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







### 3 Trouble shooting

Error	Action
<b>No display</b>	Check the cabling to the mains supply. Eventually replace the fuse.
<b>No music</b>	Check ⇒ the cabling to the source components and the amplifier. ⇒ if proper input has been selected ⇒ if the source component is in MUTE ⇒ if the amplifier is switched on
<b>POWER FAIL</b>	In case of a short circuit in the power supply the unit switches off automatically. The display shows POWERFAIL.
<b>OVERCURRENT</b>	If the current at the output is higher than 0.2 A the MUTE function is activated and the display shows OVERCURRENT.

If you cannot identify the error please disconnect the 560 D/A-Converter from the mains supply and contact your solution dealer.

### 4 Service

If your solution product needs service please contact your solution dealer. For further information see [www.soulution-audio.com](http://www.soulution-audio.com)



## 5 Safety functions

<b>Overcurrent</b>	For currents > 0.2 Ampere at the output the 560 D/A-Converter shuts down automatically.	
<b>Power supply</b>	The power supply is monitored for correct operation. In case of an error the 560 gets shut down automatically.	
<b>Fuse</b>	Model 220-240 V	2A/T 250V micro fuse 5x20mm
	Model 100-120 V	4A/T 250V micro fuse 5x20mm

## 6 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 posses 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.



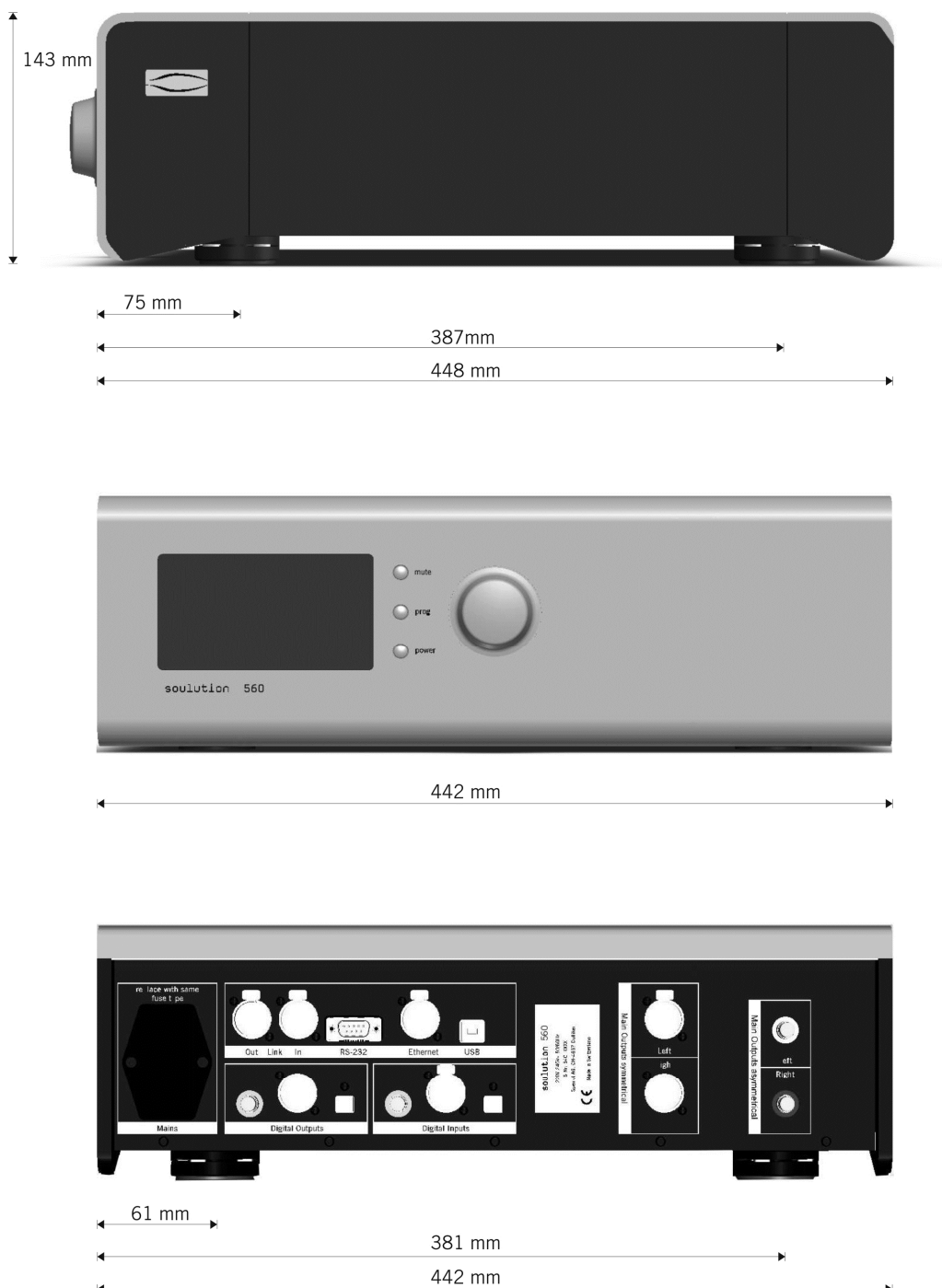
## 7

## Specification

<b>Nominal voltage</b>		
Model 220 – 240 V / 50 – 60 Hz		220 – 240 V
Model 100 – 120 V / 50 - 60 Hz		100 – 120 V
<b>Power consumption</b>		
OFF (standby)		<0.5 W
ON		50 W
<b>Main-Out</b>		
Output voltage	Balanced (XLR) Unbalanced (RCA)	4 Vrms 2 Vrms
Peak Output Current		0.2 A
Impedance		10 Ω
Frequency response		DC-100 kHz
Distortion (THD)		<0.002 %
Signal to Noise Ratio		140 dB
Volume range		0...-80 dB
Balance range		<- 9...0...9 -> dB
<b>Digital-Out</b>		
Output-Voltage	SPDIF AES/EBU	500 mV p-p 5 V p-p
Output-Impedance	SPDIF AES/EBU	75 Ω 110 Ω
<b>Digital-In</b>		
Sensitivity		0.3 - 5 V p-p
Input-Impedance	SPDIF AES/EBU	75 Ω 110 Ω
PLL – control range		+/- 100 ppm
<b>USB</b>		
Input voltage		0.4 – 2.5 V
Data		24 bit / 192 kHz
<b>Ethernet</b>		
Input voltage		0.4 – 2.5 V
Data		24 bit / 192 kHz
<b>LINK-System</b>		+12 V



## 8 Dimensions





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