

PL-audio

USER MANUAL PowerPac 5002



AMPLIFIER

- ✓ powerful 2-Channel Amplifier „Handmade in Germany“
- ✓ impressive output power (2 x 2500 Watt at 4Ohm)
- ✓ Dual-Monoblock-Construction - 2 separated Powerblocks
- ✓ Input- and Peaklimiter
- ✓ audiophile sound & light weight

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Introduction

Congratulations on purchasing a PL-AUDIO product! Your investment in the PL-AUDIO brand guaranteed quality and products "Made in Germany", excellent functionality, an almost unbeatable price / performance ratio, as well as direct and uncomplicated customer service.

We created this manual to ensure an easy start with your newly purchased product. Before you start using your new product please read this manual carefully and keep it at your hands for future reference

Safety instructions and intended usage

In order to enjoy your device for a long time please make sure to follow the informations noted hereunder:

- The device complies with the necessary directives of the EU and therefore it carries a CE mark.
- This device left our factory in perfect technical condition. In order to ensure safe operation, the user must absolutely observe the following safety and warning notices:
- The device is supplied with dangerous mains voltage (>50 Volt AC). Therefore never intervene on the device on yourself! There is a risk of electric shock! Connection cables has to be protected against crushing, tensile load and bending. Cables and wires are to be laid or secured in such a way that no one can trip over it or may fall.
- Use the device only for the applications recommended by PL-AUDIO or which can be found in this manual. In the event of improper use any warranty claims become obsolete and void.
- Use the device only indoor and protect it against dripping and splashing water, high humidity, heat and direct sunlight.
- Do not place any objects filled with liquids, such as drinking water glasses,...., on the product.
- The heat generated by the amplifier modules must be dissipated by technical forced ventilation. The built in fan switches on at a device temperature exceeding 60 and switches off at a device temperature of 40 degrees. For this reason, do not cover the ventilation openings on the housing under any circumstances. The device exhausts the warm air through the front grille.
- Do not put the device into operation and immediately pull the power plug of the device out of the socket:
 1. if there is visible damage to a device or to the power cord,
 2. if after a crash or comparable mishandling there is a suspicion of a defect,
 3. if malfunctions occur.
- In any case, send the devices back to PL-AUDIO for inspection / repair. Please send any devices in sufficient outer packaging to the PL-AUDIO production site. You can find this on the website www.pl-audio.de. Transport damage due to insufficient packaging on the part of the sender cannot be claimed. A corresponding pre-registration of a claim with a precise description of the fault - so that the devices sent in are correctly assigned - is inevitable.
- Never pull the power plug out of the socket by just pulling on the cable, always take hold of the power plug.
- Only use a dry, soft cloth for cleaning; never water or chemicals. When using compressed air please pay attention to lubricant-free compressed air and keep a minimum distance of 20 cm to the individual parts.



Transport and storage

Secure and smart handling of our products helps you to keep the value of your device. In addition to this you benefit for a longer time from the quality of your product.

For this reason, we ask you to note the following information in relation to above mentioned content point:

It is essential to install the device in a – ideally shock-absorbing – 19“-Flightcase, to protect the device from transport- and handling damage. Please note that these flight cases are not the proper housing for shipping with parcel services. Please ensure that there is sufficient air ventilation when installed. Make sure to handle the device as gently as possible during transport. We recommend to transport the unit in a horizontal position as shown on the cover (page 1). Always store the device at a minimum temperature of 05° Celsius with low humidity and without large temperature fluctuations. Avoid to expose the device to permanent direct sunlight.

Guarantee terms and conditions

PL-AUDIO gives its customers a manufacturer's guarantee of 2 years on the PowerPac 5002 product. This guarantee is retained even if the product is resold within the EU and Switzerland. The guarantee period begins with the purchase from an authorized sales or distribution partner or directly ex works. Please keep the original invoice. This must be submitted for the submission and acceptance of any warranty claims. This manual is an essential part of the product. Devices without a serial number (illegible or removed serial numbers) cannot be accepted under any guarantee.

PL-AUDIO disclaims liability for transport damage, rough handling and / or incorrect use, external manipulation on and inside the housing, unauthorized repair attempts, faulty mains voltage or mains connection, operation of the amplifier below the minimum ohmic value specified in the operating instructions, effects of moisture, massive contamination from dust, incorrect operation of emergency power systems (power generators, UPS systems, ...) and faulty feeds into the device. Furthermore, PL-AUDIO does not recognize any warranty or guarantee claims for any direct or indirect damage caused by installation, configuration, manipulation or storage of the specified software and its components.

Devices which are covered under the guarantee conditions must be sent back to PL-AUDIO after prior notification. Please send the devices in sufficient outer packaging (ideally in the original packaging) to the PL-AUDIO production site. You can find this on the website www.pl-audio.de. Please note that any service manipulation can lead to data errors or complete data loss on the device sent in. Data errors and / or data loss are not covered by warranty or guarantee. You should therefore save your presets several times on different storage media in the course of the configuration in your own interest.

In the event of any claim, no guarantee or subsidiary liability is assumed for upstream / downstream products

Individual goodwill decisions on the part of PL-AUDIO are always related to the respective individual case and in no case represent an acknowledgment of any defects. In a recognized warranty case, PL-AUDIO decides on repair or replacement at its own discretion.

Product short description

The PowerPac, low weight and top performance

Our digital 2-channel-amplifier „handmade in Germany“ is the optimum extension to our amps with built in digital signal processor PowerPac 4004 DSP and PowerPac 6004 DSP. It can also be sourced by any other controller or speaker management system.

With its 2 x 2.5 kW, the PowerPac 5002 offers the highest performance for all professional applications. In addition to the common sound reinforcement tasks, this 2-channel amplifier is suitable for the most powerful bass reproduction at live events, trade fairs, theaters and demanding fixed installations, as well as for DJs, bands and rental companies. We have also attached great importance to the proven, high-quality protection and operating circuits. The essentials: high performance at a fantastic price.

Scope of delivery

Beside the PowerPac 5002 you can find following components included:

- Mains cable with PowerCon®-male connector. Only use this cable without any manipulation on the cable itself.

Technische Daten Übersicht

2-CHANNEL CLASS D AMPLIFIER: 2 X 2500 W	INPUTLIMITER AND PEAKLIMITER
Inrush current limitation	Protection circuit against switching transients
Intelligent mains fuse protection	Low voltage and high voltage protection
DC – protection of the outputs	automatic temperatur control
Very quiet fan	High damping factor >1000 (8 Ohm, 1Khz)
Very low distortion factor: THD+N less than 0,05% (20 Hz – 20 KHz)	Signal to noise rate: Less than 120 db (20 Hz – 20 KHz)
Wide-range power supply with automatic voltage detection and automatic switch 120V – 265V	2 HE aluminium housing
Weight: just 7,3 kg	Installation depth of 410 mm
Powercon In – out	2 x On-/Off-Switch on the front
2 x XLR in and out	2 x Speakon out
2x 2,5 KW	modular setup and 2 separate power supplies

Product detailed description

The PowerPac 5002 comes with two identical amplifier blocks with separate power supplies. Thanks to the high class operation- and protection circuits the PowerPac 5002 offers – beside the audiophile presence and impressive output power of 2 x 2.500Watt – the well known and outstanding performance and operation reliability like the whole PowerPac-Series from PL-AUDIO. The clear structured connection board backside offers - beside the Speakon®-Speaker connectors (double: one connector wired on Pin 1+/1- and the other connector wired 2+/2-) – XLR signal pass through for signal forwarding to additional components, allowing the comfortable set-up of high-powered multi channel systems.

Technical data (detailed)

Output Power 8Ω @ 1% THD+N 1kHz	Output Power 4Ω @ 1% THD+N 1kHz
Ch 1 1550W 8Ω	Ch 1 2500W 4Ω
Ch 2 1550W 8Ω	Ch 2 2500W 4Ω
Amplification factor	Amplifier-Technology Class D
Ch 1 32dB	
Ch 2 32dB	

Voltage range	Automatic voltage detection
AC Range 1 / 120V	85V - 138V AC (US-Voltage)
AC Range 2 / 230V	170V- 265V AC (Europe-Voltage)
Frequency range	45Hz – 65Hz
Power consumption at 230V	
Standby	6 Watt / 0,026A
Idle = Amplifier ON – operation ready with no Input/Output-signal	2 x 27Watt = 54Watt / 0,24A
Rated power consumption (without reactive current)	2 x 340Watt = 680Watt / 2,95A (Ch1+2 8Ω)
	2 x 420Watt= 840Watt/ 3,65A (Ch1+2 4Ω)
Maximum	2400 Watt / 10,43A
Switch on peak voltage @230V	32,5A pk
Switch on peak voltage @115V	17,0A pk

Temperature range	
Environment temperature	-5°C bis +40°C not condensing!
Fan switch on temperature	60 °C
Fan switch off temperature	40 °C
Output power reduction	85 °C
Temperature – Emergency shut down	95 °C
Colling concept	Air, back to front, 1-speed
Fan	80mm, 30cbm/h, 35db(A)

Protection circuits	
True-RMS Compressor & Limiter for all Inputs and Outputs	
Switch On and Switch Off-Delay of Outputs	
ICL Inrush Current Limiter	
Intelligent current limitation prevents the triggering of fuses	
Peak current Limiter on the speaker outputs	
DC-Protection on the speaker outputs	
High frequency protection on the outputs (>30kHz, 2Sek)	
Temperature observation with output power reduction by overheating	

Measurements	
Width	482mm (19")
Height	89mm (2HE) – with rubber feets 92mm
Depth	410mm – with operation controls 430mm
Weight	7,3 kg

Construction and control interface

Following elements are located on the front side of the device (from left to right):



Nr.	Element
1	Mains switch (for each amplifier module)
2	Control-LED Power ON for each amplifier module
3	Input Gain Control
4	Signal-LED Signal: -24dB to -6dB Red Clip/Limiter
5	Control-LED Mains connected (lights up if min. one amplifier module is switched on)

Following connectors and elements are located on the **backside of the unit** (from left to right):



Nr.	Element
1	XLR Input symmetric signal
2	XLR Out symmetric signal (signal pass through)
3	Ground-Lift-Switch
4	Air ventilation fan (warm air is exhausted through the front)
5	Speakon® female connector (connection 1+/1-)
6	Speakon® female connector (connection 2+/2-)
7	Mains connector 16A Powercon® IN
8	Blind cover (for optional discrete mains connection of Amplifier module 2 with Powercon® IN)

Mains connection

The device may only be connected to an electrical installation that complies with the VDE regulations DIN VDE 0100. The electrical installation must be equipped with a residual current circuit breaker (RCD) with > 30mA rated residual current.

The device is supplied with dangerous mains voltage (>50 Volt AC). Therefore never intervene on the device on yourself! There is a risk of electric shock! Connection cables has to be protected against crushing, tensile load and bending. Cables and wires are to be laid or secured in such a way that no one can trip over it or may fall.

Damaged Mains-Power cables must not be used and should immediately be rendered unusable against further use, e.g. cut off both plugs.

The device is powered by a Neutrik Powercon® connector. In contrast to a plug-in device (such as a safety plug), the Powercon® plug-in connection must not be plugged in or disconnected under load and also not under voltage! The consequences are stuck or burned-out contacts and the resulting loose contacts lead to failures or even destruction of the electronics or even the risk of fire. You should therefore only switch the device ON or OFF using the 2-pole power switch.

The mains plug may only be connected to an earthed safety socket with the associated mains connection cable. If extension cables are used, it must be ensured that the wire cross-section is dimensioned and approved for the power supply required for the device! Make sure that the mains voltage of the socket corresponds to the permissible voltage values in this manual.

The power supply of the amplifier is equipped with an intelligent mains voltage detection. It allows worldwide operation on all power grids. After switching on, the electronics check the mains voltage and switches the power pack to the correct voltage range 115V AC or 230V AC.

If a three-phase current generator is used at events on which the device is to be operated, the correct mains voltage must be checked before connecting the amplifier! In the event of faulty three-phase power supplies without a neutral conductor, a so-called neutral point shift can result in up to 400 Volt being applied to the protective contact sockets. This overvoltage leads to the destruction of the electronics in the amplifier.

The device has a blind cover (8) over the existing Powercon®-IN (see page 7, item 7). This is provided for the optional possibility of discrete power supply of the second output stage block via a second Powercon® IN. In the original delivery condition, the two separate amplifier blocks are supplied with power via the lower located Powercon® IN. This option of redundant power supply for both amplifier blocks can be retrofitted at the factory if required, and thus enables the amplifier blocks to be operated on different current phases (e.g. block 1 to L1, block 2 to L2, ...).

Best option is to connect the PowerPac 5002 to its own circuit with a 16A fuse (characteristic curve C). Please refer to the technical data for the power consumption in the different operating states. The control LED on the front next to the respective gain control serves to check the switching status of each individual block (page 7, upper figure, number 2). The central control LED (number 5) lights up as soon as at least one block is switched on.

The device corresponds to protection class 1.

In the event of a thunderstorm or danger, pull the power plug out of the socket immediately.

To avoid ground loops, we recommend using symmetrical signal routing and the power distribution in the so-called star point earthing, which means, all ground connections meet at one single point.

Never interrupt the contact to the protective conductor (e.g. by cutting off the protective conductor, disconnecting the connection to the protective conductor through insulation, etc.), because in the event of a defect this increases the risk of a electric shock over the metal housing.

Power generator operation

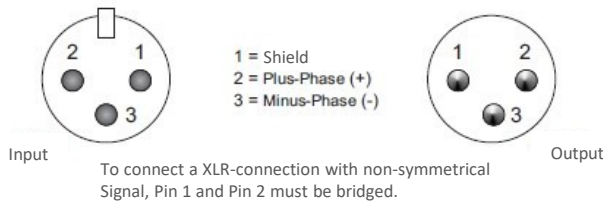
If the amplifier is operated on a power generator, this is done at your own risk!

Extensive precautionary measures must be taken before connecting and operating your device on a power generator:

- Use only high-quality, generously dimensioned power generators
- per PowerPac **at least 3kVA** rated power
- If possible, switch on an under / overvoltage shutdown, this should be at U min.200VAC undervoltage and U max. 250VAC overvoltage!
- Always **load three-phase generators equally** to avoid unbalanced loads, e.g. PowerPac 1 on L1, PowerPac 2 on L2, PowerPac 3 on L3
- Load the generator permanently with a stable base load in order to absorb voltage fluctuations. e.g. 1000W halogen lamp, electric heater etc.

XLR connection

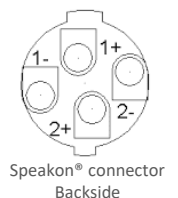
XLR inputs can be connected both balanced and unbalanced. Symmetrical cables are to be preferred, as they provide better protection against external interferences on long cable routes. The inputs Input A and Input B can be controlled with signals up to + 24dBu. The user has the option of further processing the fed-in XLR signals via the XLR Out socket, e.g. in another PowerPac. Pay attention to the following assignment of the XLR connection.



Speaker connection

Before loudspeakers are connected to the Speakon® outputs of the PowerPac 5002, reduce the output level of the upstream components to the lowest possible value (e.g. fader down or left stop; ∞) in order to reduce/avoid any unwanted and possibly damaging noises in the connected loudspeakers. Also turn the gain controls on the front to the left. Make absolutely sure that any upstream crossover or any upstream limiter is set correctly. Due to the high output power of the PowerPac 5002, non complete or incorrect settings can damage the connected loudspeakers due to overload!

The Speakon® sockets (7, black) on the back of the device (page 7, lower picture) are intended for the loudspeaker cabling. The upper sockets transmit the signal via pins 1 + / 1- on the Speakon® connector, while the lower sockets transmit the signal via pins 2 + / 2 + on the Speakon® connector.



With the system cabling from PL-AUDIO (also from numerous other manufacturers), only a single 4-pin Speakon® cable is laid between the power amplifier and a sub / top combination to each side of the system. With PL-AUDIO, pins 1 + / 1- are wired for the tops, pins 2 + / 2- for the bass.

When connecting the system using prefabricated connection panels, patchbays or adapter plugs / adapters, make sure that the signals are correctly assigned to the correct components! This is of top importance when using the PowerPac 5002 for wiring bi-amp systems. Special care must be taken, as possible incorrect cabling can quickly lead to the destruction of the mid-range or high-frequency driver!

Important notice: Do never load the output channels with less than 4Ω!

Speaker connection

Example: 2x 8Ω speaker, parallel connected results 4Ω
 2x 16Ω speaker, parallel connected results 8Ω

In order to avoid an overload of your amplifier connect only ONE Speakon®-connector (either the above or the lower one) with your speakers. Never run speaker configurations with a lower nominal impedance than 4Ω!

Damages on the amplifier modules or other electric circuits due to overload or to low nominal impedance are not covered by any warranty or guarantee!

Installation

Please note that if the device is cold and transported into a warm environment, condensation will form inside the device. To avoid damage and malfunctions due to condensation / moisture, let the device acclimatise first.

To avoid unpleasant and possibly damaging noises in the loudspeakers, always switch the individual components on in the direction of the signal path. So first the player, then the mixer and only at the end the power amplifiers. When switching off, just proceed in reverse order.

Each block of the PowerPac 5002 has a ground lift switch for each power amplifier block on the rear of the device (see page 7, figure 3 below). This is used to be able to separate the ground loops with potential hum loops in the case of multiple earthing. However, it can also lead to a deterioration in existing hum loops and grounding by means of a ground lift switch. If so, you just have to try it out here. Should the signal deteriorate in spite of star-shaped cabling and grounding by means of a ground lift switch, we recommend that you redo the XLR cabling.

After switching on the device, a self-test and initialization are carried out. The fan runs up once for approx. 4 seconds. During the start-up process, the loudspeaker outputs of the power amplifier are muted and are activated automatically as soon as the power amplifier is ready for operation. This protective circuit prevents unpleasant "cracking" noises in the loudspeakers.

The amplifier is ready for operation approx. 10 seconds after switching on and the front control LEDs (page 7, upper figure, number 2) on each power amplifier block and the central control LED (number 5) light up green.

ATTENTION: The power amplifier has a gain control on the front panel for each power amplifier block! To be on the safe side, turn it all the way to the left BEFORE switching on.

When you have made all connections, turn the two gain controls on the front panel slowly to the desired value or the desired volume to the right with the signal being played softly. If you do not hear an output signal on the connected loudspeakers, check the cabling again before turning the level up any further. In any case, avoid the limiter LED lighting up continuously (page 7, upper figure, number 4). This not only leads to a loss of sound, but can also damage connected speakers!

The PowerPac 5002 offers the user numerous possible uses:

Each output stage has 1 output channel with 2500W/4Ω per amplifier block. This power is made available at the Speakon sockets® in black (wiring 1+ / 1- above or 2+ / 2- below).

This means that several configurations can be **operated per power amplifier block** (see examples below):

- up to 2 subwoofers á 8 ohms (via upstream crossover or crossover in the subwoofer)
- Up to 2 fullrange tops with built-in crossover of 8 ohms in full range operation
- Up to two monitors or front fill loudspeakers with built-in crossover of 8 ohms in full-range operation
- many other combinations (e.g. multi-room or multi-speaker applications) in which the sum of the nominal impedance per power amplifier channel does not fall below 4 ohms.

If you connect an 8Ω loudspeaker to the output of the PowerPac 5002, it receives 1250W into 8Ω. If you add another loudspeaker á 8Ω, the impedance is reduced to 4Ω. The 2500W (which are available at 4Ω) are now divided between both speakers, and each speaker receives 1250W at 8Ω.

Calculation example: (1250W 8Ω + 1250W 8Ω = 2500W 4Ω)

The following examples give a brief overview of the various configuration options.

Connection example stereo fullrange to passive fullrange tops:



Signal flow (from mixing console to speakers):

XLR Out L/R mixing console to Input A/B on the PowerPac 5002

Speakon® Block 1 to Fullrange-Topteil L (1+/1-)

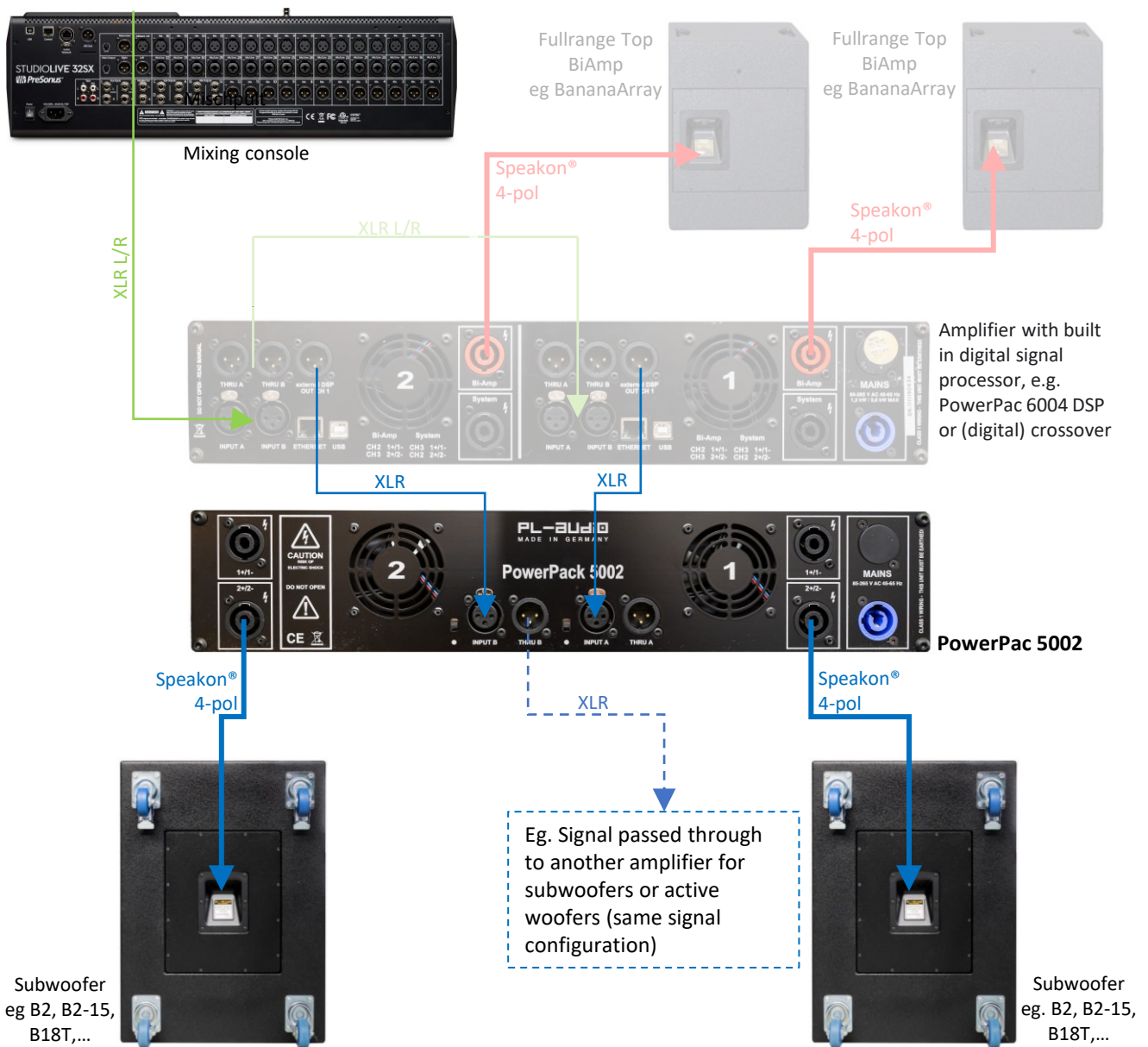
Speakon® Block 2 to Fullrange-Topteil R (1+/1-)

XLR Thru A/B for additional components eg amplifier, active speakers,...

Eg. to additional amplifier for eg sidefill or front fill or to active speakers

In the example above, the PowerPac 5002 supplies up to two tops (or monitors) with an integrated crossover and a nominal impedance of 8 ohms (2500W) per amplifier block. The signal assignment to the midrange and tweeter in the tops / monitors is done by a crossover built into the tops / monitors. In the example above, the Thru A / B could be passed on to a further power amplifier with connected loudspeakers or active loudspeakers. In this case, please note that the signal is looped through directly without any level adjustments or EQ-ing.

Connection example amping for subwoofer:

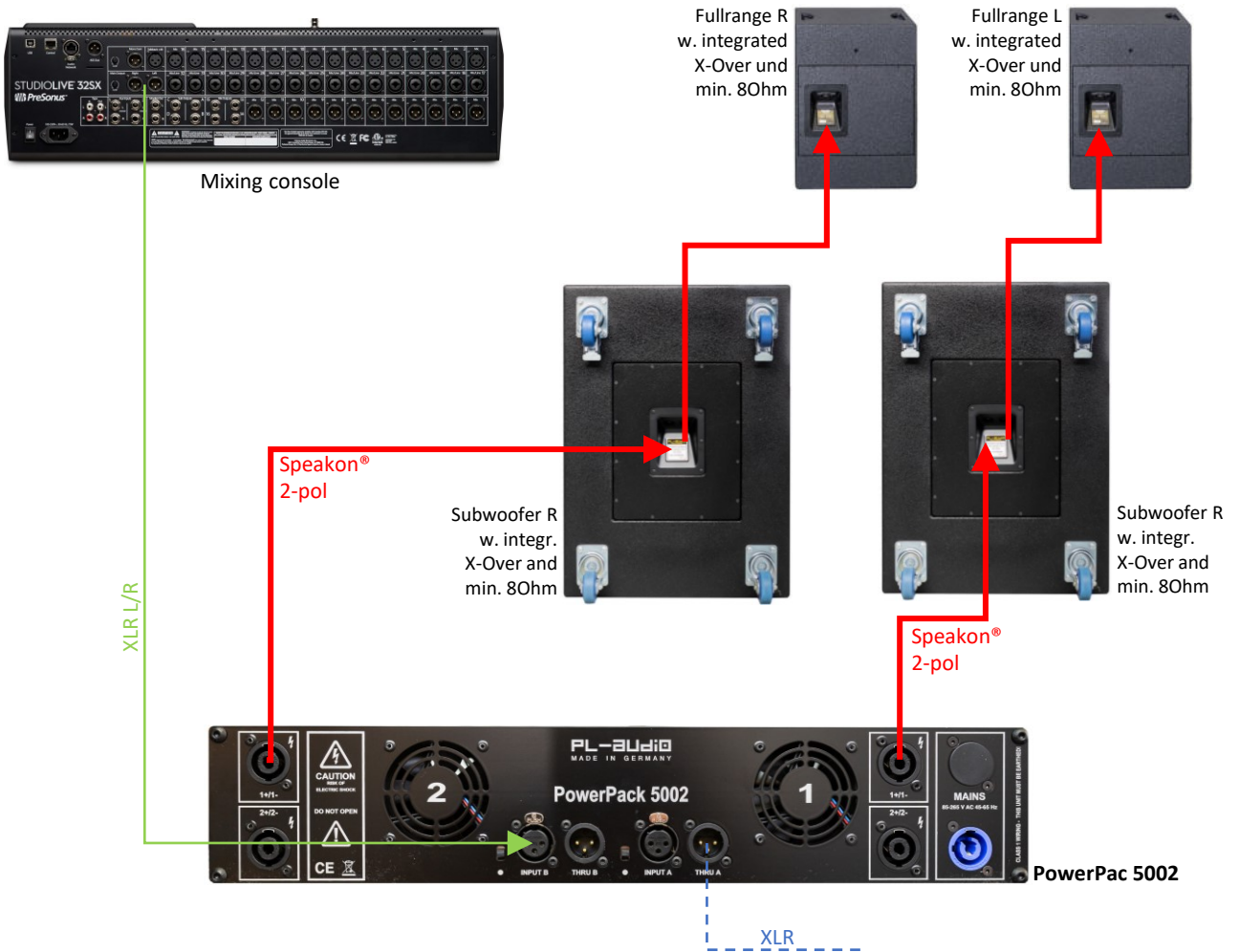


Signal flow (from mixing console to speakers):

- XLR L/R Out mixing console to Input A/B of a PowerPac 6004 DSP
- Interlink connection PowerPac 6004 DSP
- DSP Out Channel 1 of Block 1&2 to Input A/B PowerPac 5002
- Speakon® PowerPac 5002 (2+/2-) to Subwoofer (Block 1 & 2)
- XLR-Thru A/B to another subwoofer amplifier

Here the PowerPac 5002 controls up to two subwoofers with at least 8 ohms (or one subwoofer with 4 ohms) per amplifier block, via the lower Speakon sockets® with circuitry 2 + / 2- (circuitry of the subwoofer depends on the manufacturer; it may be necessary to connect to the upper Speakon sockets® with circuitry 1+ / 1-). In the example above, the input signal (low pass), processed in terms of frequency, comes from the DSP outputs of a PowerPac 6004 DSP, which takes over the full signal management in this example. However, this signal may also come from a crossover network or a separate, dedicated output on the mixer (mono sub out, subgroup, matrix output, etc.). The Thru A / B XLR output can be fed to another subwoofer amplifier or active subwoofers with the same signal requirement.

Connection example stereo fullrange to subwoofer with integrated crossover and passive fullrange Tops:



Signal flow (from mixing console to speakers):

XLR Out L/R mixing console to Input A/B In @ PowerPac 5002

Speakon® Block 1 to Subwoofer L (1+/1-)

Subwoofer L to Fullrange-Topteil L (1+/1-)

Speakon® Block 2 to Fullrange-Topteil R (1+/1-)

Subwoofer R to Fullrange-Topteil R (1+/1-)

XLR Thru A/B to additional components, eg amplifier, active speakers,...

Eg. to additional amplifier for eg sidefill or front fill or to active speakers

In the example mentioned above, the PowerPac 5002 takes over the supply of a subwoofer with integrated crossover and 80hm and a top part with integrated crossover and 80hm (2500W) per power amplifier block. The signal assignment to the subwoofer as well as the midrange and tweeter in the tops is handled by a passive crossover built into the subwoofer and the tops / monitors. In the example above, the Thru A / B could be passed on to another power amplifier with connected loudspeakers or active loudspeakers. In this case, please note that the signal is looped through directly without any level adjustments or EQing.

Safety during operation

The PowerPac 5002 carries a CE-Mark. According to the applicable accident prevention regulations, an annual VDE 0702 test must be carried out. Furthermore, the device has - in accordance with the ordinance of industrial safety – to be categorized in a company-specific risk assessment and be registered in a company specific document. For all other countries, pay attention to the local applicable ordinances, test regulations and test intervals. Keep the manual of this product freely available for all users of the product.

Maintenance

The PowerPac 5002 is almost maintenance-free. However, keep the unit free of dust so that the necessary cooling air can circulate properly. There are no user-serviceable components inside the PowerPac 5002.

Leave necessary maintenance work, such as cleaning with compressed air, to qualified specialists. The following applies to all work in the device: Before opening the housing pull the power plug!!! Please note that unauthorised opening of the housing automatically invalidates the warranty!

Disposal

According to the national electrical and electronic equipment law - ElektroG, PL-AUDIO is a German manufacturer and EAR-registered (Registration office for waste electrical and electronic equipment register).

The registration number of PL-AUDIO in Germany is WEEE - Reg. No. DE 68629698.

Please do not dispose any PL-Audio products with household, residual or bulky waste or give them to the public collection points for disposal. PL-AUDIO products are professional electrical devices, so-called business-to-business products (B2B). Old devices will be taken back by us and through our contract company Electro recycling GmbH, Landstrasse 91, 38644 Goslar, disposed professionally and in a resource-saving manner sent to the collection of recyclable materials. We have therefore marked all devices affected by the ElektroG with the crossed-out garbage can. This symbol indicates that it must not be disposed of with household waste. But also not known signed older PL-AUDIO products, the disposal of which the owner would be responsible for, we are happy to take for disposal. To implement our obligations from the Packaging Ordinance, we have joined us to the dual system - EKO-PUNKT.

Impressum

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