

FL-audio

USER MANUAL MiniPac 2004 DSP



FREE PROGRAMMABLE SYSTEM AMPLIFIER

- ✓ powerful 4-channel amplifier „Handmade in Germany“
- ✓ remarkable power (4 x 500W @ 4 Ohm or 2 x 1.000W @ 80hm)
- ✓ front cooling system
- ✓ free programmable DSP
- ✓ audiophile presence, small depth & light weight

Table of content

<u>Chapter</u>	<u>Page</u>
Introduction	3
Safety instructions and intended usage	3
Transport and storage	4
Guarantee terms and conditions	4
Product short description	4
Technical data overview	5
Detailed product description	5
Technical data detailed	6
Scope of delivery	7
Construction and control interface	8
Signal flow DSP and connection panel	9
Mains connection	10
Usage on a mains power generator, XLR- and speaker connection	11
Bi-amp connection	12
Bridge Mode (BTL-Modus)	13
Network communication, installation, limiter settings	14
Network connection, LowCut-Function, possible usage	15
Connection examples	16
Loading of presets on the device, internal mixer	19
DSP control via Software PL-audio DSP Control, Firmware update process	20
Restore firmware and bootloader	21
Safety during operation, maintenance	22
Limiter table	23
Disposal, Impressum	24

Introduction

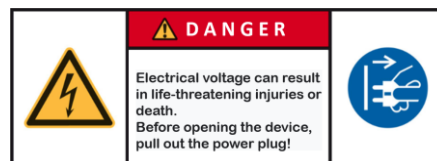
Congratulations on purchasing a PL-audio product! Your investment in the PL-audio brand guaranteed quality and products "Made in Germany", excellent functionality, an almost unbeatable price / performance ratio, as well as direct and uncomplicated customer service.

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 advise and intendeds 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 saf operation, the user must absolutely observbe the following saftey and warning notices:
- The devicve 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 obsolet 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 amliplier modules must be dissipated by technical forced ventilation. The built in fan switches on at a device temperature exceeding 60 and switches of 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 compartable 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.

Warranty conditions

PL-audio gives its customers a manufacturer's guarantee of 2 years on the MiniPac 2004 DSP 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

Digital 4-channel power amplifier "Handmade in Germany".

The MiniPac 2004 DSP offers extensive functions that professional users need for many common sound reinforcement tasks. The user interface, which has been deliberately kept simple, with a choice of 5 DSP presets and a volume control on the front, makes the MiniPac 2004 the ideal installation power amplifier, not just because of its compact dimensions. Audiophile presence, low weight and a freely programmable DSP are features that mobile DJs, musicians or sound engineers need for smaller sound reinforcement tasks. The MiniPac 2004 DSP solves a wide range of sound reinforcement tasks with flying colors.

Technical data overview

4-CHANNEL CLASS D AMPLIFIER: 4 X 500 W OR 2 X 1000 W MONO-BRIDGED	INPUT-LIMITER AND PEAKLIMITER
switch-on current limitation	Protection circuit against switching transients
Mains fuse protection	Under- and overvoltage protection
DC – protection	Automatic temperature monitoring
silent fan	Signal-noise rate < 120 db (20 Hz – 20 KHz)
Distortion THD+N under 0,05% (20 Hz – 20 KHz)	2 HE aluminum casing
Wide range power supply with voltage detection and automatic switching 120V – 230V	Depth 210 mm
Weight 2,8 kg	Switch on/off on front
Powercon In – out	4 x Speakon 4 pole out for system connection
2 x XLR in und out	Gain fader on front panel

HIGH END DSP ON BOARD	REAL TIME OPERATION VIA ETHERNET AND USB (OPTIONAL W-LAN)
Simple operation	
5 presets direct accessible – 80 presets through PC	96 KHz Sampling-Rate
120 db Dynamic Range	flexible routing
X – Over Function	20 parametric EQ's
Limiter- and Noisgate-Function	short- and long delay
Phase	Firmware – Upgrade over interface
APP in preperation	

Product detailed description

The PowerPac 2004 DSP has two identical power amplifier modules. A digital signal processor with a multitude of setting options (X-Over, Compressor, Limiter, signal routing, parametric equalizer, delay, ...) takes care of signal processing and loudspeaker management in a deliberately simple menu. The over-complete connection field on the back has - in addition to the loudspeaker system connections (4-pin Speakon®) - XLR signal loop-through for the input channels. This means that the MiniPac 2004 DSP is ideally equipped, especially in the installation area, to handle signal processing and signal routing for simple multi-channel systems, while at the same time being simple to operate and comparatively low in weight.

Technical data / detailed

Output Power 8Ω @ 1% THD+N 1kHz			Output Power 4Ω @ 1% THD+N 1kHz		
Ch 1	250W 8Ω	} BTL-Mode: 1.000W 8Ω	Ch 1	500W 4Ω	
Ch 2	250W 8Ω		Ch 2	500W 4Ω	
Ch 3	250W 8Ω	} BTL-Mode: 1.000W 8Ω	Ch 3	500W 4Ω	
Ch 4	250W 8Ω		Ch 4	500W 4Ω	
Amplification factor			Amplifier-Technology Class D		
Ch 1	26dB	} BTL-Mode: 32dB			
Ch 2	26dB				
Ch 3	26dB	} BTL-Mode: 32dB			
Ch 4	26dB				

DSP-Technology	DSP-G2.3
Preset memory (internal)	80
Input-Impedancy	20kΩ
Max. Input level	+24dBu / 12V RMS
Bit rate	64Bit
Sampling rate	96kHz Sample-Rate
Input Dynamic Range	120dB (A)
Latency DSP	0,6 ms
Distortion factor THD+N	0,005% / 8Ω, 1kHz
Signal to noise-rate	118dB (A) / 8Ω, 1kHz
Frequency range	10Hz-25kHz
USB	USB 1.1
Ethernet	10MBit, with DHCP Server, Auto/Manual IP-Adress
Input-Delay	800 ms / 274m (Input 1+2)
Output-Delay	5 ms / 1,715m (Output 1+2+3)

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	0,72 Watt / 0,026A
Idle = Amplifier ON – operation ready with no Input/Output-signal	4 x 16,5 Watt = 33 Watt / 0,14A
Rated power consumption (without reactive current)	4 x 95 Watt = 380 Watt / 1,65A (Ch 1+2 8Ω)
	4 x 175 Watt = 700 Watt / 3,04A (Ch 1+2 4Ω)
Maximum	1.400 Watt / 6,09A
Switch on peak voltage @230V	32,5A pk
Switch on peak voltage @115V	17,0A pk

Measurements	
Width	482mm (19")
Height	89mm (2HE) – with rubber feets 92mm
Depth	210mm – with operation controls 230mm
Weight	2,8 kg

Technical data / detailed

Temperature range	
Environment temperature	-5°C bis +40°C not condensing!
Fan switch on temperature	n.a. fan runs permanently
Fan switch off temperature	n.a.
Output power reduction	n.a.
Temperature – Emergency shut down	85 °C
Colling concept	Air, front In → front Out, 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	

Scope of delivery

Beside the MiniPac 2004 DSP you can find following components in the carton box:

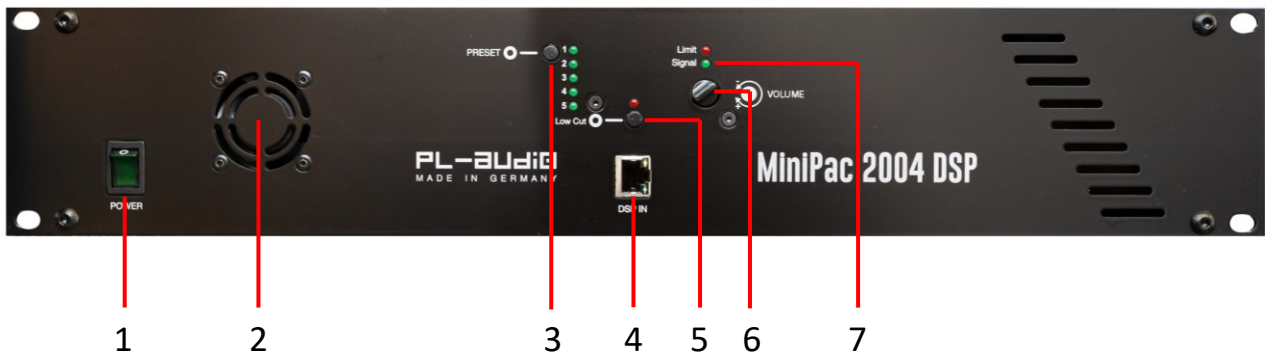
- Mains cable with PowerCon®-male connector. Please do just use this cable without any manipulation on the cable itself.

IMPORTANT: Before you operate the MiniPac 2004 DSP you have to do the required settings in the free downloadable software. If you use the MiniPac 2004 DSP directly out of the carton box without the necessary settings fitting your requirements, connected speakers may get damaged or at least will not bring their full power or sound capabilities!

How you can conduct these settings with the software (for PC and Mac, free of charge) is explained in detail in the corresponding hand book for the digital signal processor (Operation manual DSP G2.3, download www.pl-audio.de).

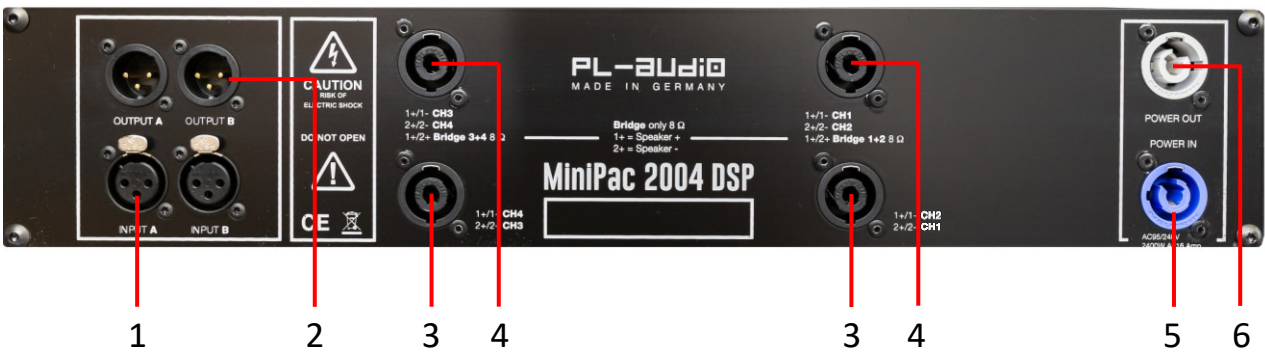
Construction and control interface

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



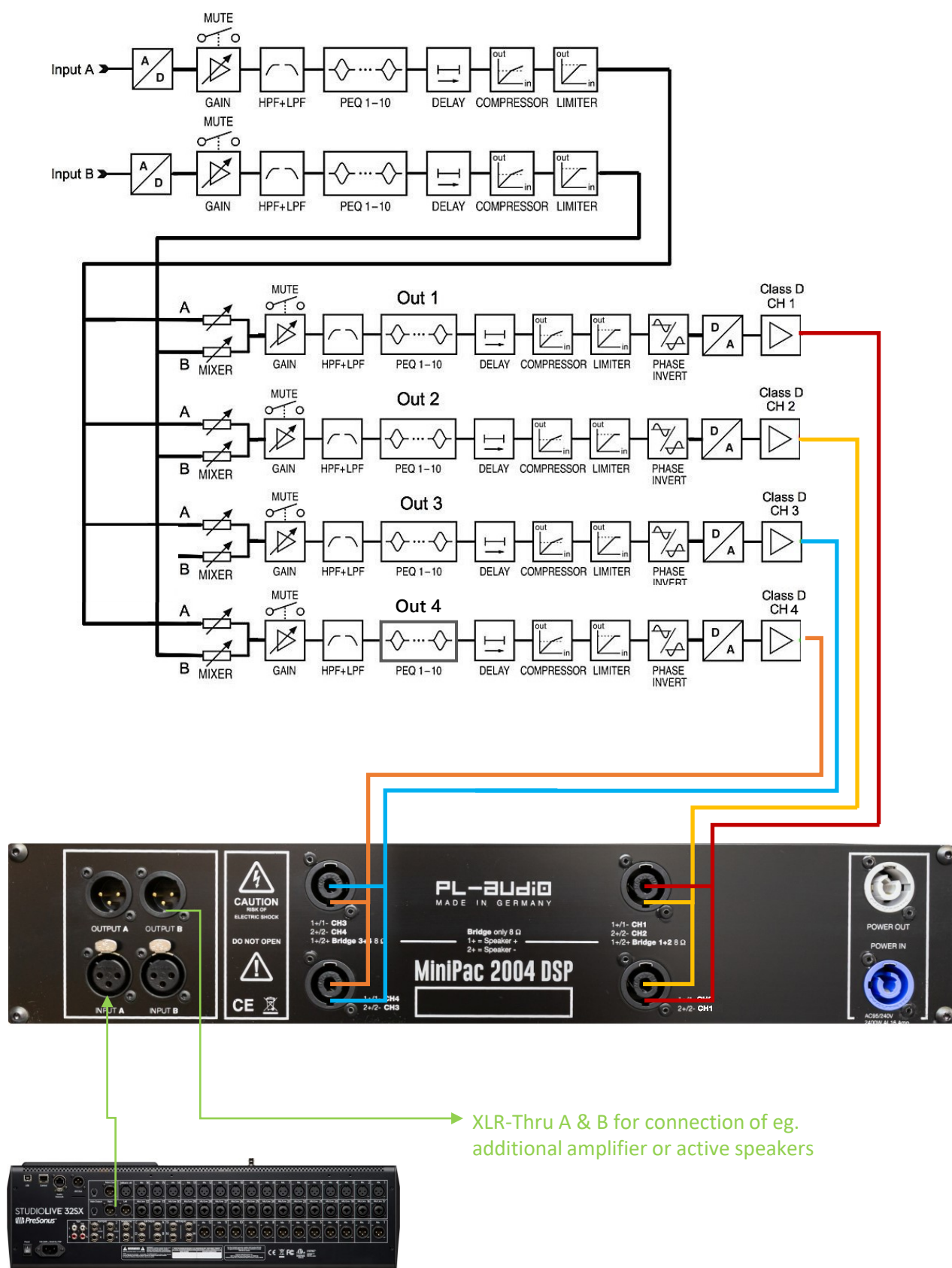
Nr.	Element		
1	Mains switch		
2	Fan		
3	Preset selector with LED-indicator of loaded presets 1-5		
4	Ethernet connector for Network connection of the DSP via Router or Computer		
5	LowCut button with control-LED (illuminates if filter is switched on)		
6	Gain		
7	Signal-/Limiter-LED	Signal, -24dB to around -6dB	red=Clip/limiter

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



Nr.	Element		
1	XLR Input symmetric		
2	XLR Out symmetric signal pass through		
3	4 pol. Speakon® connector for Bi-Amp operation (CH 4 = 1+/1-; CH3 = 2+/2-)		
4	4 pol. Speakon® connector for system cabling (CH 3 = 1+/1-, CH 4 = 2+/2-) plus Bridged Mode connection		
5	Mains connection 16A Powercon® IN blue		
6	Mains pass through connection 16A Powercon® OUT grey		

Signal flow DSP plus connections



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 have 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 on the front panel of the unit.

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 PowerCon®-Out (6) over the existing Powercon®-IN (5). This is provided for the option of connecting another device through a short interlink PowerCon®-cable e.g. when built in in a rack with other amplifiers or other devices. Please make sure that the overall power consumption of all connected devices does not exceed the maximum power of 16 Ampere, or the maximum allowed power limited by the upstream line circuit breaker.

Please refer to the technical data for detailed information regarding power consumption of the MiniPac 2004 DSP.

Best option is to connect the MiniPac 2004 DSP 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 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

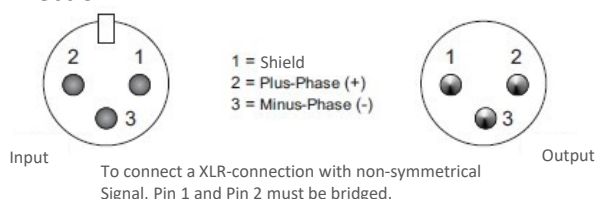
If the amplifier is operated on a power generator, this is done at your own risk!

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

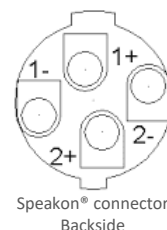
XLR inputs can be connected both balanced and unbalanced. Symmetrical cables are to be preferred, as they provide better protection against external interferences on long cable routes. Depending on the operating mode or preset of the power amplifier, only certain XLR inputs are used. The operating mode of the device can be set using the preset button on the front for the first 5 presets (1-5) and via the software for the remaining 75 presets (6-80) by loading the respective preset. 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 MiniPac 2004 DSP, 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. Make absolutely sure that any upstream crossover or any upstream limiter is set correctly. Due to the high output power of the MiniPac 2004 DSP, non complete or incorrect settings can damage the connected loudspeakers due to overload!

The upper Speakon® outputs on the rear panel (page 8, lower picture, number 4) are intended for the system cabling of PL audio systems. With the system cabling – assuming the correct preset is selected - only a single 4-pin Speakon® cable is laid between the power amplifier and a sub / top combination to each side of the system. Pins 1 + / 1- are wired for the tops, pins 2 + / 2- for the bass. The lower Speakon® outputs are available so that third-party systems can also be conveniently wired using a four-pole Speakon® cable. These are - also assuming the selection of the appropriate preset - wired mirror-inverted to the upper connections (pins 1 + / 1- bass and 2 + / 2- tops).



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 MiniPac 2004 DSP 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!

2.6 Speaker connection

SELECTING THE CORRECT PRESET IS ABSOLUTELY CRUCIAL FOR CORRECT OPERATION, CORRECT CONFIGURED OUTPUT AND MAXIMUM SOUND QUALITY!!!

Before loudspeakers are connected to the Speakon® outputs of the MiniPac 2004 DSP the corresponding preset must be loaded on the signal processor! Only with the correct presets, specially developed for the loudspeakers by PL-audio reach their maximum performance, the best possible sound and the necessary operational reliability.

By loading the wrong the speakers my sound bad and / or may be damaged through overload!

If you want to operate loudspeakers from other manufacturers on the MiniPac 2004 DSP, there are enough free preset memory spaces available on the device! As a starting point we recommend the "01. Sub + Top Standard" preset to be loaded and sent to your speakers plus conducting the absolutely necessary adjustments (gain, HPF, LPF, EQ, limiter, etc.).

In order to avoid overloading the power amplifiers, among other things, connect only ONE Speakon connector® per power amplifier module 1 + 2 or 3 + 4 to your loudspeakers!
Damage to the amplifier modules due to overload due to low nominal impedance is not covered by warranty or guarantee!

Bi-Amp connection

2-way actively separated loudspeakers do not have a built-in passive crossover. On such loudspeakers, each path has its own amplifier channel. An amplifier channel operates the midrange speaker (s) (e.g. channel 2 - mid) while another amplifier channel drives the Tweeter(s) (e.g. channel 3 - high). This Bi-Amp system uses a 4-pole Speakon® cable (page 8, item 3, rear panel) between Speakon® connector and loudspeaker, where pins 1 + / 1- transmit the processed and amplified signal of channel 2 and 4, while the processed and amplified signal of channel 1 and 3 is transmitted via pins 2 + / 2-. **When wiring bi-amp systems it must be worked out with particular care, as incorrect cabling quickly leads to possible destruction of the high-frequency driver!**

PL-audio Bi-Amp presets are usually locked in the signal processor with password protection in order to prevent unintentional changing of the parameters. If you make changes here do this very carefully, with caution and expertise! The signal processor allows very deep and detailed, but also serious changes in the transmission parameters of the speaker system! To change the bi-amp presets, log in with the password:"Admin1" in the administrator user level of the signal processor. Now you have full access to change all necessary parameters.

This is easy and convenient with the PL-audio DSP-CONTROL software on the PC.

PL-audio Bi-Amp speakers without built in X-Over are:

TS 42	Banana Array	Line Array LA206
TS 61	Big Banana Array Line	Line Array LA208
TS 62	Array LA210	

IMPORTANT NOTICE FOR NORMAL OPERATION:
NEVER LOAD THE OUTPUT CHANNELS IN NORMAL MODE WITH LESS THAN 4Ω!!!

Example: 2 x 8Ω loudspeakers, connected in parallel result in 4Ω
 2 x 16Ω loudspeakers, connected in parallel result in 8Ω

IMPORTANT NOTICE FOR BRIDGED MODE ON CHANNEL 1/2+3/4:
NEVER LOAD OUTPUT CHANNEL 2+3 IN BRIDGED-MODE WITH LESS THAN 8Ω!!!

BTL-Mode

The bridged operation (BTL) couples the power from channel 1 + 2 (500W / 4Ω) and channel 3 + 4 (500W / 4Ω) to a strong 1x1000W / 8Ω mono channel. The maximum impedance is 8Ω, never connect 4Ω loudspeakers! The BTL bridge operation increases the voltage gain from 26dB to 32dB (+ 6dB)!

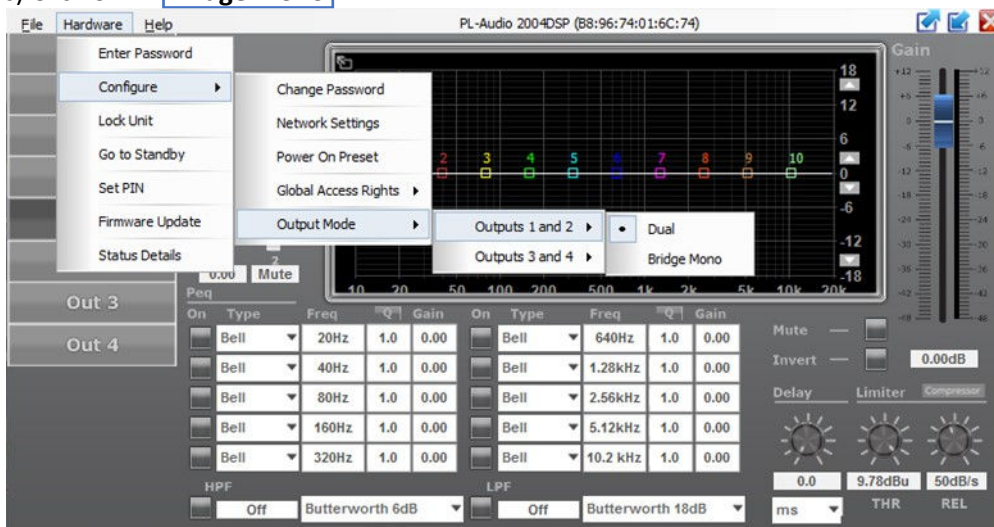
ATTENTION: The bridge operation can NOT be set or recognized on the amplifier! You need a computer with the DSP software to set the BTL bridge operation.

We recommend that power amplifiers with the BTL mode set be clearly marked or reset the BTL mode to dual mode after using the MiniPac 2004DSP.

Set-up BTL-Mode:

1. Connect the DSP to the PC. Start the software and open the control window.
2. In the **MAIN** window, switch on the link button (illuminates in blue) for channels 1/2 + 3/4 (linking Ch1 & Ch2 or Ch3 & Ch4).
3. Make all settings for your loudspeaker in output **Out 1** and **Out 3** of the DSP.
4. Make sure you calculate the limiter with a **gain factor of 32dB** and **set it correctly!**
5. Now switch on the bridge mode in the PC software:

- a) Click in the Menu on **Hardware**
- b) Choose **Configure** → **Output Mode** → **Outputs 1 and 2** and/or **Outputs 3 and 4**
- c) Click on **Bridge Mono**



In **Bridge-Mono** -mode all buttons of **Out 2** and **Out 4** are not accessible in the software

All settings in the DSP controller must be made in Out 1 or Out 3.

Connecting the loudspeaker in BTL mode:

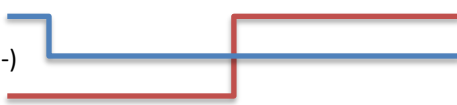
Only use the **two upper connection sockets** on the connection panel for bridge operation! Make sure that the Speakon® connectors are wired properly and protected against short circuits.

Speakon®-connector

- 1+ Pluspole, Channel 1/3 (+)
- 1- Minuspole, Channel 1/3 (-)
- 2+ Pluspole, Channel 2/4 (+)
- 2- Minuspole, Channel 2/4 (-)

Loudspeaker, 8Ω

- + Pluspole Loudspeaker
- Minuspole Loudspeaker



Never connect impedances with less than 8Ω to the amplifier in bridged operation !!!

Network communication

Page 8 (MiniPac-front panel, item 4) Network / Ethernet Interface

With the network interface you can integrate the DSP controller into a local network, to control and operate it remotely through longer distances with the PL-audio DSP-CONTROL software. If you connect a wireless router to the network port, you can take advantage of wireless remote control with a W-LAN-enabled device!

The network port also offers the option of connecting the DSP directly via a commercially available network cable (up to 100m in length, CAT5e or higher) directly to a computer.

If the DSP is not automatically registered in the IP universe of the computer through the direct connection PC → DSP, an intermediate router is required, which has DHCP server functionality that automatically assigns an IP address that can be located by the computer.

The network port is designed as 10-Mbits Ethernet. RJ-45 connector standard.

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.

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.

Before switching on the power amplifier for the first time, it is not possible to check which volume or which speaker preset is set! Therefore, please always turn the volume level of your signal source (mixer) to a minimum.

ATTENTION: The power amplifier has a gain control on the front (page 8, upper figure, number 6)! To be on the safe side, turn it all the way to the left BEFORE switching on. Alternatively, you can also unplug the XLR signal cable or the Speakon® speaker cable.

When you have made all connections, switch on the amplifier, check whether the correct preset is loaded and increase volume gently until you hear the signals from your speaker system. 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 8, upper figure, item 7). This not only leads to a loss of sound, but can also damage connected speakers!

Limiter settings

If you program your own presets in addition to the factory presets, we strongly recommend that you calculate and set the limiter settings for the respective channels precisely in order to protect your connected speakers from overload! The limiters are already set at the factory presets.

Network connection

If you want to remotely monitor the DSP via W-LAN, for example, connect the network connection socket (RJ 45) on the front to a suitable router or directly to your computer. You can then easily make the settings on the computer and monitor the power amplifier remotely.

Limiter settings

If you should program your **own presets** in addition to the factory presets, we strongly recommend that you **calculate and set the limiter settings for the respective channels precisely** in order to protect your connected speakers from overload! The limiters are already preset in the factory presets.

LowCut-button (Page 8, uooyer picture, item 5)

The LowCut button on the front can be used to switch a LowCut filter that can be programmed via the software into the input path. To program, go to the "IN 1" menu of the software. At the bottom you will find a button "HPF" with the option of entering the desired crossover frequency and the option of selecting the filter slope via the drop-down menu. Here you can set or select both the frequency and the slope. If you leave this input window empty, the LowCut switch on the front has no effect on the signal reproduction.

If the "HPF" filter is activated in the software, the associated red LowCut indicator LED also lights up on the PowerPac 2004 DSP. After saving the settings in the desired preset this high-pass filter can be switched on or off using the LowCut button on the front of the MiniPac 2004DSP.



The MiniPac 2004 DSP offers the user numerous possibilities:

The amplifier has 2 output channels per amplifier block, 2 x 500W 4Ω. This power is made available at the Speakon sockets®, which are located one above the other for each power amplifier module. The upper sockets are connected as system cabling sockets with Ch 1 to 1 + / 1-, Ch 2 to 2 + / 2- and Ch 3 to 1 + / 1-, Ch 4 to 2 + / 2-, while the lower sockets are used as bi-amping sockets with Ch 1 on 2 + / 2-, Ch 2 on 1 + / 1 + and Ch 3 on 2 + / 2-, Ch 4 with 1 + / 1-.

Several configurations can be operated per power amplifier block (see examples below):

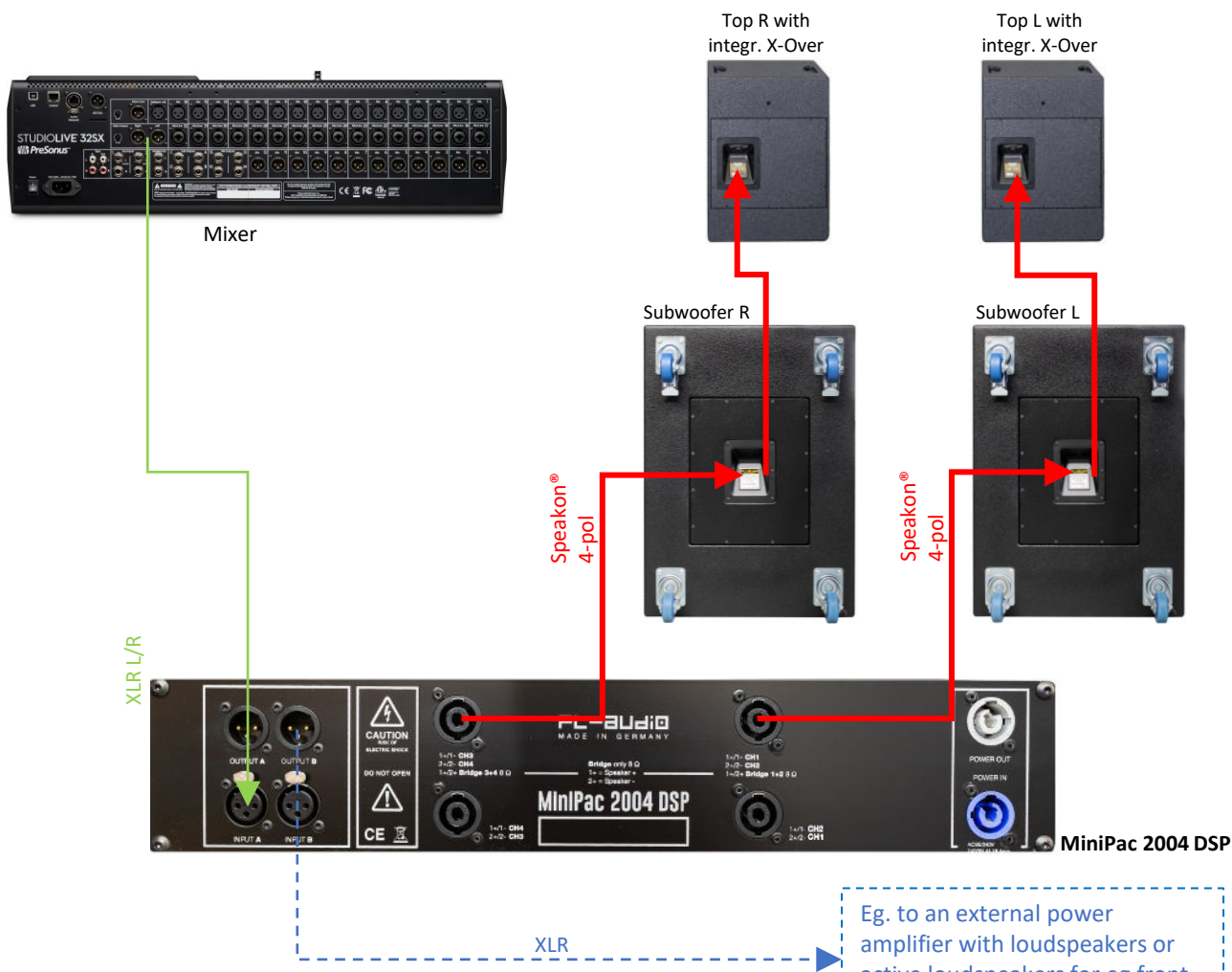
- Up to 2 subwoofers á 8 ohms and 2 tops with built-in crossover á 8 ohms.
- Up to two monitors with built-in crossover of 8 ohms plus, for example, two side or front fills of 8 ohms with built-in crossover
- many other combinations (e.g. multi-room or multi-speaker applications) in which the sum of the nominal apparent resistance per power amplifier channel does not fall below 4 ohms.

If you connect an 8Ω loudspeaker to channel 1 or 2 of the MiniPac 2004 DSP, it receives 250W into 8Ω. If an additional loudspeaker á 8Ω is added to channel 1 or 2, the impedance is reduced to 4Ω. The 500W (which are available at 4Ω) are now divided between both speakers, and each speaker receives 250W at 8Ω. Calculation example: (250W 8Ω + 250W 8Ω = 500W 4Ω). The same principle mentioned above applies to channels 3 + 4 of the MiniPac 2004 DSP.

The ideal use of the MiniPac 2004 DSP is as a system amplifier for smaller system applications - with subwoofer and tops or - thanks to the extensive setting options of the built-in digital signal processor - various multi-room or multi-speaker applications in the installation area. Last but not least, the MiniPac 2004 DSP can also drive smaller subwoofers with at least 8 ohms in bridge mode with 1kW.

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

Connection example stereo to passive subwoofers and tops :



Signal flow (from mixing console to speakers):

XLR Out mixer to Input A/B In on the MiniPac 2004 DSP

Thru A/B from MiniPac 2004 DSP to external amplifier or active speakers

Speakon® CH 3/CH 4 to Subwoofer R (2+/2-)

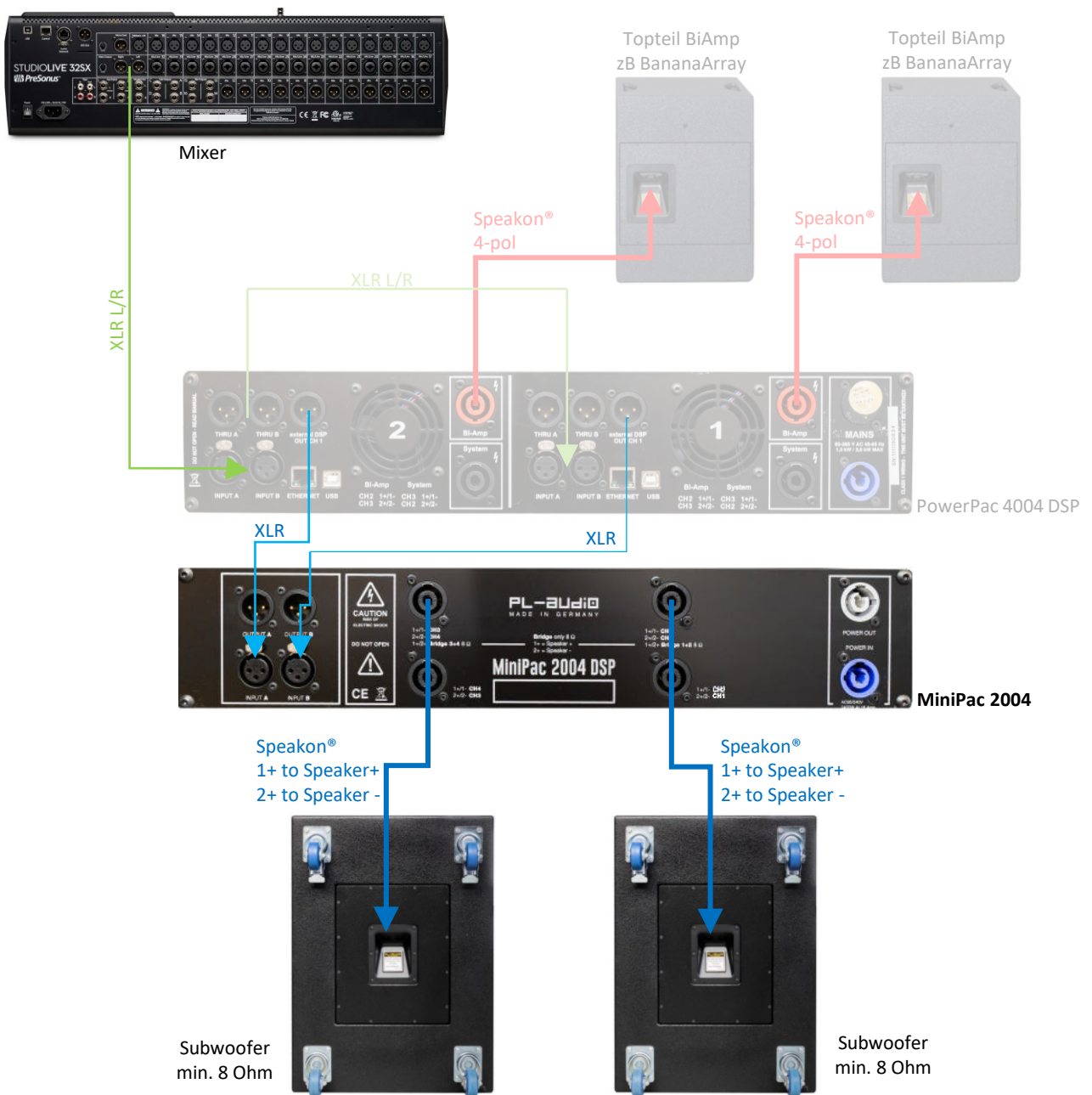
Speakon® CH 1/CH 2 to Subwoofer L (2+/2-)

Speakon® from Subwoofer R to Top R (1+/1-)

Speakon® from Subwoofer L to Top L (1+/1-)

In the example given above, the MiniPac 2004 DSP takes on the supply of up to 2 subwoofers á 80hm (500W) and up to two tops with integrated crossover á 80hm (500W) per power amplifier block. The specific frequency range assignment for the subwoofer (Low Pass / HiPass) or the tops (HiPass) is made in the DSP. With PL-audio, both components, subwoofer and tops, can be connected to the upper Speakon sockets® (CH 1 / CH 2 and CH 3 / CH 4) using a 4-pin Speakon cable®, whereby channel 2 + / 2- transmits the bass signal and channel 1 + / 1- transmits the signal to the tops (mid & high). The signal assignment to the midrange and tweeter in the tops is done by a crossover built into the tops. In the example above, the XLR Thru could control the front or side fill via an external amplifier (e.g. MiniPac 2004 DSP). In this case, please note that the signal coming from the input signal is looped through unchanged.

Connection example MiniPac 2004 DSP in BTL-Mode as power amplifier for 8Ohm-Subwoofer:



Signal flow (from mixing console to speakers):

XLR Out mixer to Input A/B In on Block 2 PowerPac 4004 DSP

Thru A/B from Block 2 to Input A/B Block 1 PowerPac 4004 DSP

DSP Out Channel 1 from Block 1&2 to Input A/B MiniPac 2004 DSP

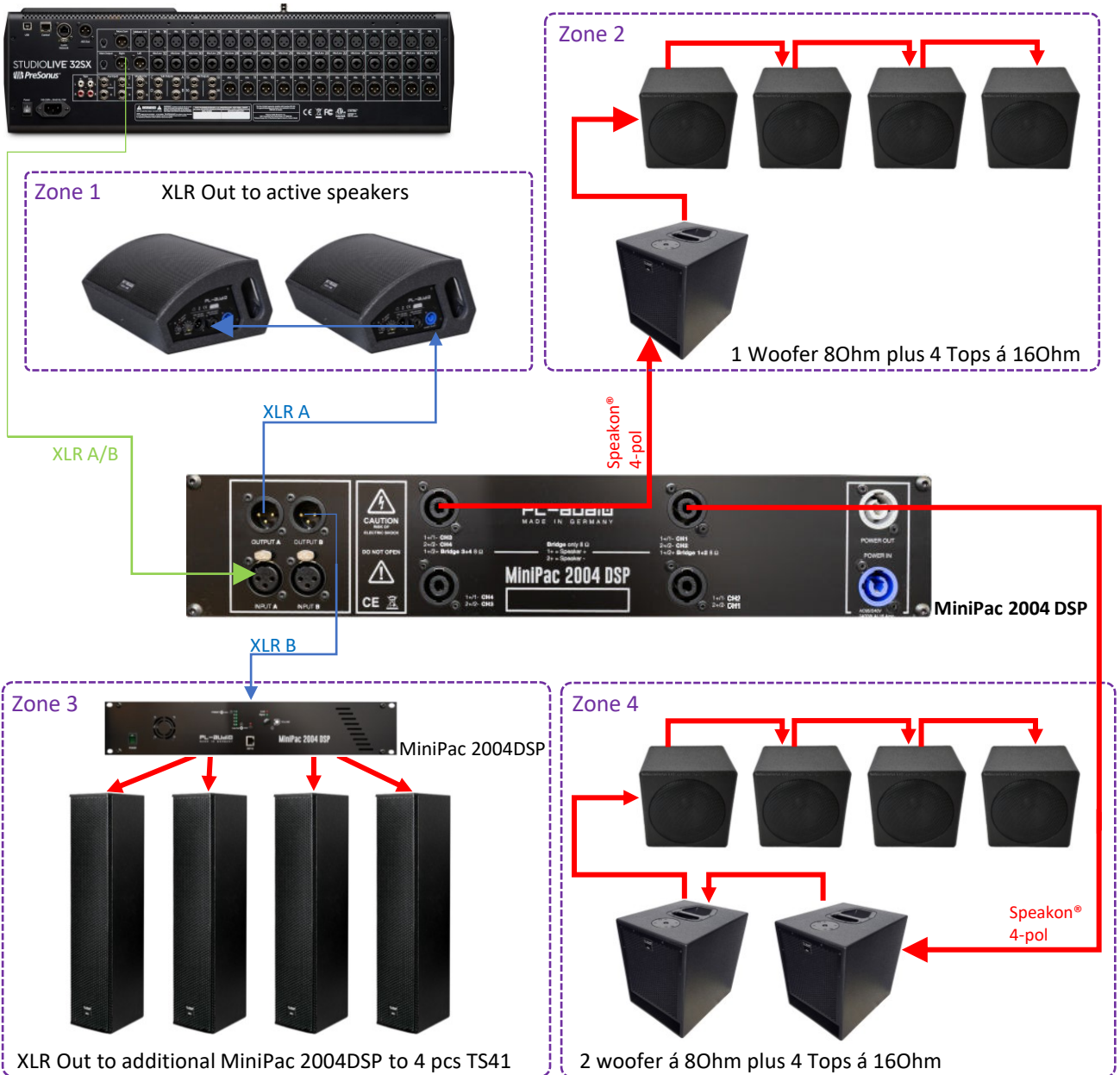
Speakon® BiAmp Out Block 2 to BananaArray R

Speakon® BiAmp Out Block 1 to BananaArray L

Speakon® SPECIAL CABLE to Subwoofer (Modul 1 & 2) pls see connection graph on page 13

In this example, the inputs A / B of the MiniPac 2004 DSP receive the Hi- and Low-Pass processed subwoofer signals from an external power amplifier with DSP (here the PL-audio PowerPac 4004 DSP) or a crossover. In this example, the MiniPac 2004 DSP drives an 8-ohm subwoofer in BTL mode (Bridge Tied Load) with a maximum output of 1.000 watts at 8 ohms per power amplifier module using a specially wired Speakon cable® (1+ to subwoofer + and 2+ to subwoofer -).

Multi zone connection:



In the example outlined here, the MiniPac 2004 DSP supplies up to 2 subwoofer á 80hm (500W) and up to four tops with an integrated crossover á 160hm (500W) per power amplifier block. Both components, subwoofers and tops, can be connected to the upper Speakon sockets® using a 4-pin Speakon cable®, whereby channel 2 + / 2- transmits the bass signal and channel 1 + / 1- transmits the signal to the tops (mid & high). The signal assignment to the midrange and tweeter in the tops is done by a crossover built into the respective tops.

In the example above, the loudspeaker groups are divided into different zones. For this example, it is very likely that you will not use the stereo sum of the mixer, but rather deliver an individual matrix mix to the two inputs A and B. The XLR-Thru is fed to 4 passive loudspeakers (e.g. TS 41) via an external four-channel amplifier (e.g. MiniPac 2004 DSP) using an XLR cable. In this case, please note that an individual signal or level adjustment on the output side is not possible for the XLR Thru, as the signal is looped through directly and unchanged. The volume for the 4 TS41s in Zone 3 listed in the example - driven by a MiniPac 2004 DSP - could be achieved here, for example, using the frontside located gain control of the MiniPac 2004 DSP in Zone 3.

Loading of presets on the device

Up to 80 presets can be stored in the flash memory of the DSP controller. You can load the first 5 presets from a list with a maximum of 80 presets stored in the memory using the preset selection button on the front panel (page 8, upper picture, number 3). The presets that cannot be called up using the button on the front of the MiniPac 2004 DSP can be called up using the software and, if necessary, also reconfigured to the first five memory locations. Presets can be labeled with up to 16 characters. Please do not use any special characters when naming.

Load preset:

- Press the preset selection button on the front (page 8, upper figure, number 3) until you have reached the desired memory location with the control LED. At memory location 5 the selection jumps back to 1 after pressing it again.
- Allow the DSP a few seconds to load the preset properly before sending a signal to the inputs.

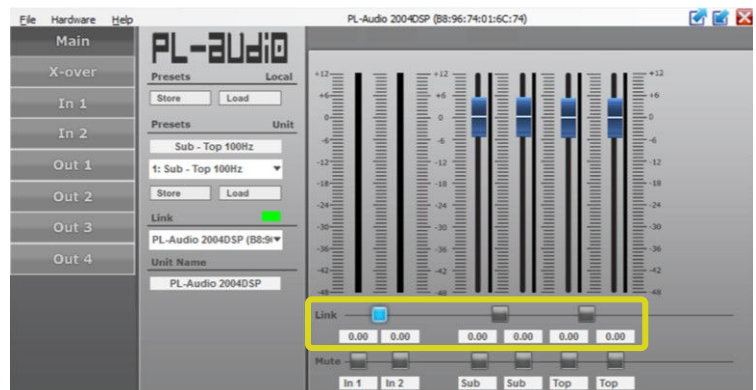
The preset is now in the signal processor and the parameters are executed.

Tip: When configuring for installation purposes, we recommend that you save the installation configuration identically in memory locations 1-5, so that if you accidentally press the preset selection button, undesired configurations and any associated undesired sound parameters do not occur.

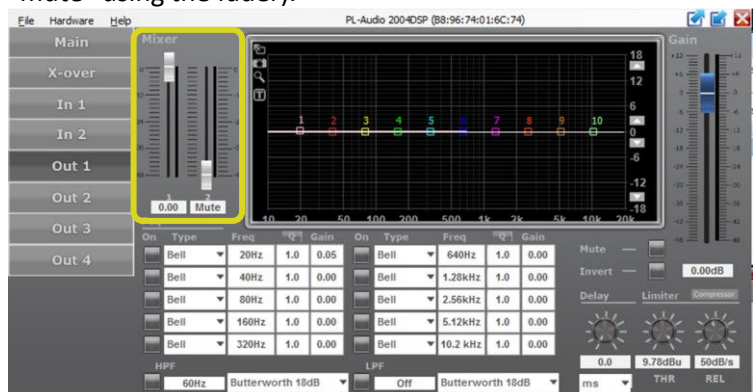
Mixer

Using the built-in DSP, the signal curve and the signal level can be set individually for each input and output channel via the mixer. Inputs A & B and outputs 1 & 2 or 3 & 4 can be linked in pairs using the link buttons below the respective faders. When the function is switched on, the color of the button changes from gray to blue. Any settings can only be made in input A and outputs 1 and 3 for linked inputs and outputs.

The values are adopted directly for input B and outputs 2 and 4.



For the respective outputs, the mixer selects which input signal is used at which level. When using the output for a subwoofer, we recommend using the input signal from both inputs. For stereo localization, the input channel that is signal-relevant for the respective output is used (e.g. input A for left → in the mixer input A to the desired value, while input B is set to “mute” using the fader).



DSP control via PL-audio DSP Control

User levels / Access-Level (Password protection)

To prevent inadvertent or undesired changes to the signal processor during operation or when renting / lending, the DSP can be locked with password protection. (Access Level: Locked)

In the PL- Audio DSP-Control software click in the control window on the menu item:

Hardware → Lock Unit → Confirm the upcoming advise with OK.

The DSP has 3 user levels, which can be called up by entering the corresponding password.

1: Locked – Level	DSP Locked
2: User – Level	Password: PLAudio1
3: Admin – Level	Password: Ad_min

If you have blocked DSP access via the display or the control window on the PC, all setting options in the controller cannot be configured.

To regain access, enter the passwords for either the user or admin level via the display or the control window on the PC and activate the user rights. All setting options can now be called up again.

The input field for the password in the computer software can be found in the control window under the menu item

Hardware → Enter Passwort→ now the input window opens in the software.

Firmware Update Process

In order to always have the latest firmware on the signal processor, you should carry out a firmware update regularly. The update can only be carried out with a PC. Please always download the latest DSP control software from the PL-audio homepage and install it on your computer.

This application contains 2x the firmware uploader.

Once in the network manager for a complete new installation and in the control window under the menu item Hardware → Firmware Update

Important: Please note that with a firmware update all presets saved on the flash memory of the DSP will be lost. It is therefore essential to save these presets on your computer BEFORE an update!

For the firmware update you should preferably use the network interface on the DSP, since the bootloader of the network chip is updated at the same time.

Firmware Update Process

After you have established the network / USB connection, start the PL-audio DSP-Control software on your computer. The network manager now opens, in which the connected PL-audio DSPs in the network or at the USB ports are listed. Now click on "Tools" in the menu bar of the network manager and select „Enable Update“

If firmware version 3.8.7 or higher is installed on your DSP, you can carry out an update directly from the "USER" level. After click on the orange button on the right in the window, the software will carry out the update after confirming the message window with OK.

If an older firmware version such as 3.1.5 is installed on your DSP, no user rights are available for the update. The update button is gray in this case. To do this, you must first open the control window with the start button (green arrow) and then click on *Hardware* → *Enter Password* in the menu bar at the top of the control window.

Enter the password "Ad_min" here. After you have entered the correct password, you will find the message (administrator) in the status bar. You can now close the control window again.

The update button is now orange in the network manager. Press this orange button to start the update.

After confirming the message window with OK, the software carries out the update. The firmware update takes about 60 seconds, depending on the interface speed.

IMPORTANT NOTICE: Please do not interrupt the power or data connection to the device during the update process. This leads to the deletion of the firmware on the DSP!

Erased / faulty firmware

If the computer system is interrupted, crashed or hung up during the update process, first close the application.

Then switch off the MiniPac 2004 DSP.

Check the network or USB connection and restart the PL-audio software.

Now switch the MiniPac 2004 DSP back on. The fan will now start up briefly. If the display is dark and does not work, the DSP does not have any firmware.

Restore erased or faulty Firmware

You can upload the firmware to the DSP at any time via the network or USB interface using the firmware upload function of the network manager.

Click in the network manager „Tools“ → „Enable Update“

As soon as the DSP has been recognized on the computer, the DSP control software will locate the device. It is displayed in the network manager as "No Name".

In order to upload the software just click the orange button.

After confirming the upcoming message with OK, the software carries out the update.

After a few seconds, your DSP is ready for use again and you can start configuring or adding the presets.

Restore deleted / faulty bootloader of the network chip

If the DSP can no longer be reached via the network interface, the cause may be a deleted bootloader in the network chip. You can upload it again within a few seconds, and your DSP will then be found again via the network manager of the DSP control software.

- Switch off your PowerPac 4003DSP.
- Connect to the DSP-Control Software.
- Open the DSP Control Software and choose in the menu „Tools“ the function „Enable Update“
- Switch on your PowerPac 4003DSP. Please be aware you have just some few seconds...
- Quickly push in the network manager in the line „Start up“ righthand the orange button and confirm the upcoming advise window with „OK“.
- The firmware-uploader opens and runs the upload of the bootloader (1).

Note: while the firmware uploader is working, you can tell from (1) that the network chip is being updated and (2) that the DSP firmware is being uploaded.

Safety during operation

The MiniPac 2004 DSP 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 MiniPac 2004 DSP 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 MiniPac 2004 DSP.

Leave necessary maintainance 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!

The table below shows the limiter settings for the majority of the loudspeakers from PL-audio:

Lautsprecher	Leistung (RMS)	Impedanz (ohm)	Limiter CH1 (32dB verstärkung)	Limiter CH2/3 (26dB verstärkung)
F5 (8ohm)	100	8	-0,76	5,24
F5 (16 ohm)	100	16	2,26	8,26
F25	200	8	2,26	8,26
F8 / F8 pro	250	8	3,22	9,22
F10	300	8	4,02	10,02
F10 pro	400	8	5,27	11,27
F121	400	8	5,27	11,27
F12	700	8	7,70	13,70*
TS41	600	4	4,02	10,02
TS61/62 High	500	4	3,22	9,22
TS61/62 Mid	700	4	4,69	10,69
M10CX	300	8	4,02	10,02
M121CX	300	8	4,02	10,02
M12CX	450	8	5,78	11,78
M15CX	500	8	6,23	12,23*
uniray	650	8	7,37	13,37*
Pigbox	1200	4	7,03	13,03*
LA210	600	8	7,03	13,03*
LA206	400	16	8,28	14,28*
LA12Sub	500	8	6,23	12,23*
B12Sub	1000	8	9,24	---
B15Sub	1000	8	9,24	---
B18Sub	1200	8	10,04	---
B18DL	1200	8	10,04	---
B18HXL	1200	8	10,04	---
B2-18	2400	4	10,04	---
B3	3200	4	11,29	---

*maximal zulässiger Ausgangspegel bei PowerPacs: +12dBu

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 Electrorecycling 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

This manual is the sole and unrestricted intellectual property of PL-audio GmbH & Co KG based in D-57482 Wenden. All originatorrights and copyrights are held by PL-audio GmbH & Co KG. A duplication fulfillment (printing or copying or electronic) of this manual - even in part - requires our express written consent. Errors, typesetting and printing errors reserved. The operating steps listed in this manual apply only finally for the device named in the manual and cannot be transferred to other devices - even in sequences or in the same way. When using the device described in the manual, be sure to observe the corresponding, locally applicable legal requirements and legal framework. For any direct and indirect damage to people, structural facilities (mobile and immobile) or other equipment or tangible or intangible property due to non-observance of the specifications or operating steps of the previous, no liability whatsoever is accepted. Speakon® and PowerCon® are registered Trademark of Neutrik AG, Im alten Ried 143, 9494 Schaan, Liechtenstein. All information in this document is based on the documents, functions, information and safety regulations for the individual components of this device or the current status of the technique, available at the time of publication. PL-audio reserves the right to make adjustments (within the framework of the statutory provisions) Improvements in product quality are useful at any time and without prior notice.