

PL-audio

USER MANUAL PowerPac 4004 DSP



FREE PROGRAMMABLE SYSTEM AMPLIFIER

- ✓ powerful 4-channel amplifier „Handmade in Germany“
- ✓ massive Power (4 x 800W or 2 x 1.400W @ 8Ohm)
- ✓ 2 discrete power supplies – redundant design
- ✓ free programmable DSP
- ✓ audiophile presence & 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 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 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 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 amplifier 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 PowerPac 4004 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

The PowerPac 4004 DSP offers extensive functions that the professional user needs for many common sound reinforcement tasks. When developing the PowerPac 4004 DSP, we deliberately focused on the essentials in terms of equipment, performance and user-friendliness. Audiophile presence, low weight, massive power and a freely programmable DSP are features that the mobile DJ, musician or sound engineer needs for medium to large sound reinforcement tasks. The two separate channel strips, which can be individually adjusted in the DSP, enable a large number of configurations and make the PowerPac 4004 DSP a universally applicable power amplifier. The PowerPac 4004 DSP should therefore not be missing from any rental inventory.

Technical data overview

4-CHANNEL CLASS-D AMPLIFIER: 4 X 800 W	INPUT LIMITER AND PEAKLIMITER
switch-on current limitation	Protection circuit against switching transients
Intelligent mains fuse protection	Under- and overvoltage protection
DC – protection on outputs	automatic temperature monitoring
Very silent fan	High damping factor >1000 (8 Ohm, 1Khz)
Distortion THD+N under 0,05% (20 Hz – 20 Khz)	Signal-noise rate < 120 db (20 Hz – 20 Khz)
Wide range power supply with voltage detection and automatic switching 120V – 230V	2 HE Aluminium Housing
Weight just 7,4 kg	Depth of 410 mm
Powercon In – out	2 x Switch on/off on front
4 x XLR in and out	2 x Speakon 4 pole out for system connection
2 x Speakon out (red) as Bi-Amp	Modular design 2 discrete power supplies
additional DSP-Out (XLR), for feeding additional amplifiers	

HIGH END DSP ON BOARD	REAL TIME OPERATION VIA ETHERNET AND USB (OPTIONAL W-LAN)
Simple operation	Manual operation with encoder wheel and buttons
5 presets direct accessable – 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 4004 DSP has two identical power amp blocks with separate power supplies. A digital signal processor with a large number of setting options (X-Over, compressor, limiter, signal routing, parametric equalizer, delay,...) takes over the signal processing and loudspeaker management in each of the power amplifier blocks in a deliberately simple menu navigation. In addition to the loudspeaker system connections (4-pin Speakon®), the more than complete connection panel on the back has XLR signal loop-throughs for the input channels, as well as a separate XLR connection for DSP channel 1 for connection to an external power amplifier. The PowerPac 4004 DSP takes care of the signal processing and signal routing for powerful multi-channel systems, while at the same time being easy to use and comparatively light in weight.

Technical data (detail)

Output Power 8Ω @ 1% THD+N 1kHz		Output Power 4Ω @ 1% THD+N 1kHz	
Ch 2	400W 8Ω	Ch 2	800W 4Ω
Ch 3	400W 8Ω	Ch 3	800W 4Ω
BTL-Mode: 1.400W 8Ω			
Amplification factor		Amplifier-Technology Class D	
Ch 2	26dB		
Ch 3	26dB	BTL-Mode: 32dB	

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 USB-B connector
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	6 Watt / 0,026A
Idle = Amplifier ON – operation ready with no Input/Output-signal	2 x 25Watt = 50Watt / 0,21A
Rated power consumption (without reactive current)	2 x 180 Watt = 360Watt / 1,565A (Ch2+3 8Ω)
	2 x 335 Watt = 670Watt/ 2,91A (Ch2+3 4Ω)
Maximum	1400 Watt / 6,09A
Switch on peak current @230V	32,5A pk
Switch on peak current @115V	17,0A pk

Measurements	
Width	482mm (19")
Height	89mm (2HE) – with rubber feets 92mm
Depth	410mm – with operation controls 430mm
Weight	7,4 kg

Technical data (detail 2)

Temperature range	
Environment temperature	-5°C bis +40°C nicht kondensierend!
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 In → Front Out, 1-speed
Fan	80mm Lüfter, 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 PowerPac 4004 DSP you can find following components in the carton box:

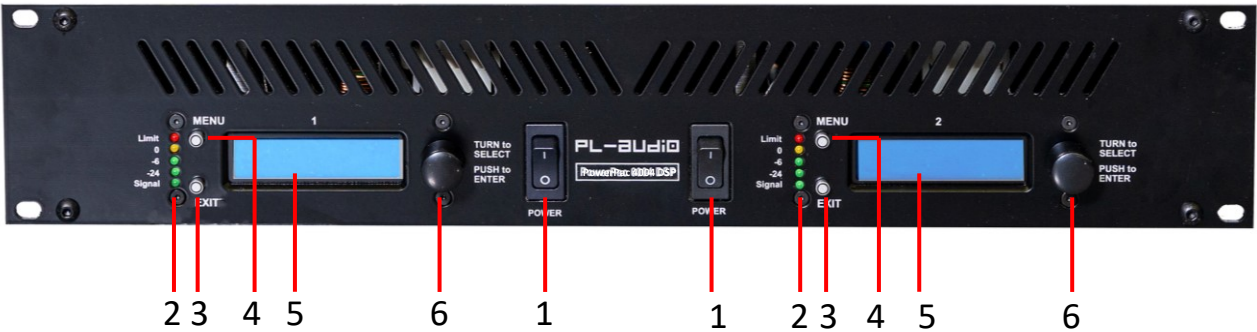
- Mains cable with PowerCon®-male connector. Please do just use this cable without any manipulation on the cable itself.

IMPORTANT: Before you operate the PowerPac 4004 DSP you have to do the required settings in the free downloadable software. If you use the PowerPac 4004 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).

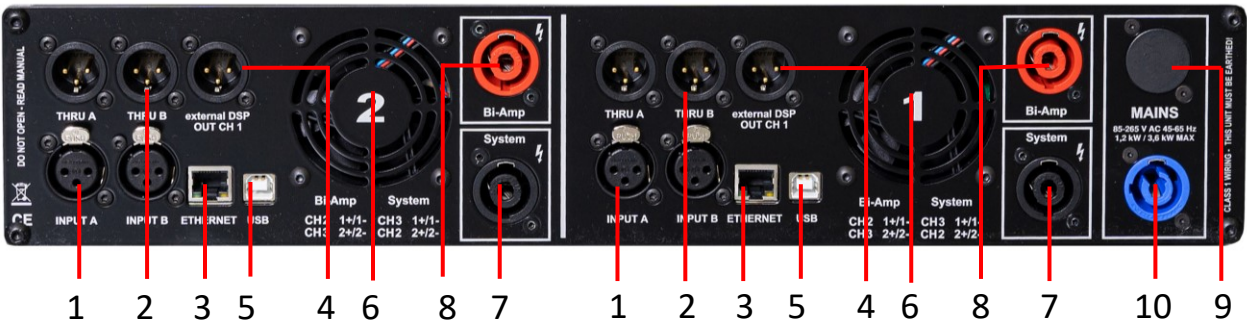
Construction and control interface

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



Nr.	Element
1	Mains switch
2	LED signal indicator / Signal, -24dB to -6dB, yellow 0dB, red clipping (red blinking = Mute)
3	Button Exit / leaving the menue
4	Button Menu / call up the menue and confirmation of a name or password
5	LCD Display / upper line: device name, lower line: loaded preset
6	Encoder wheel / Turn = Select, Push = confirmation/execute

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

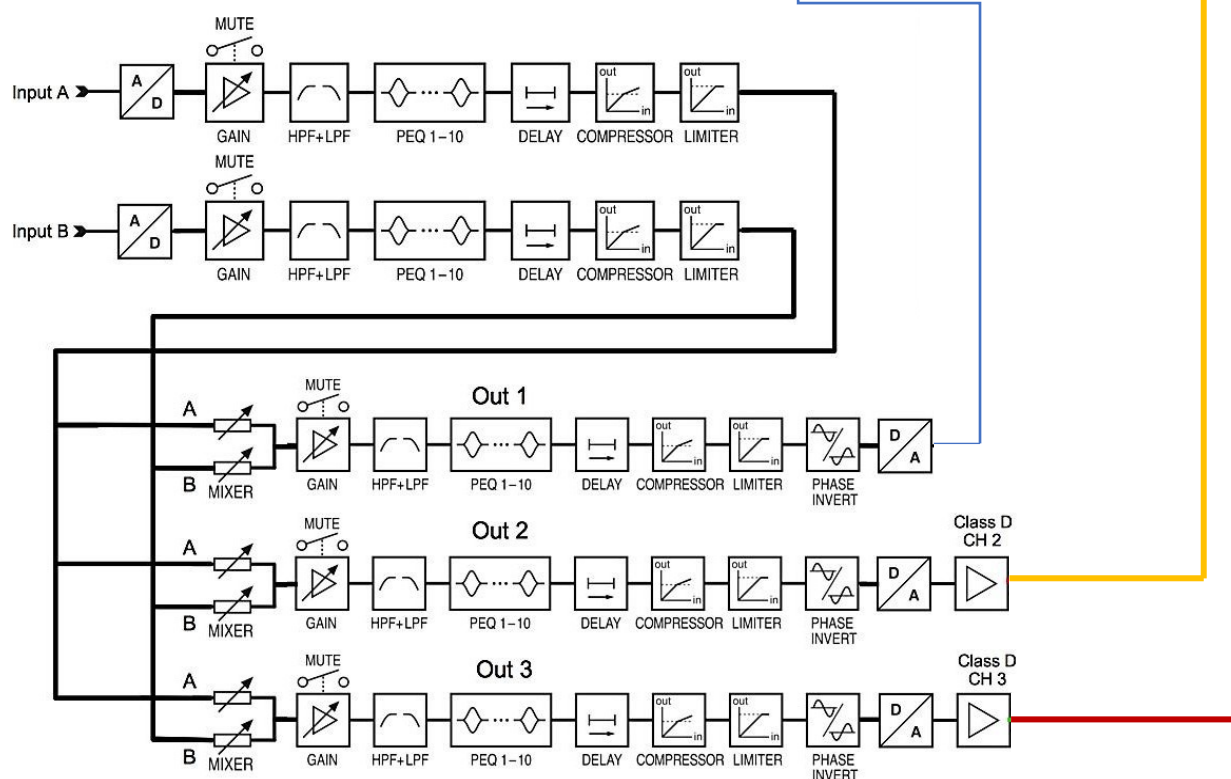


Nr.	Element
1	XLR Input symmetric
2	XLR Out symmetric signal pass through
3	Ethernet connector for network connection to the DSP via Router or Computer
4	XLR- Out symmetric, DSP Out Channel 1 (CH 1)
5	USB connector Type USB-B for connection to an external computer
6	Fan
7	4 pol. Speakon® connector for system cabling (CH 3=1+/1-; CH 2= 2+/2-)
8	4 pol. Speakon® connector for Bi-Amp operation (CH 2= 1+/1-; CH3= 2+/2-)
9	Blind cover (for optional discrete mains connection of the second amplifier block via Powercon® IN blue)
10	Mains connection 16A Powercon® IN blue

Signal flow DSP and connectors



XLR-Thru A & B to connect another amplifier or Interlink connection to Block 2 of the PowerPac 4004 DSP



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 blind cover (9) over the existing Powercon®-IN (see page 8, item 10). This is intended for the optional possibility of discrete power supply of the second amplifier block via a second Powercon® IN. In the original delivery state, the two separate power packs are together supplied with power via the lower Powercon® IN. This option of redundant power supply for both amplifier blocks can be retrofitted at the factory if desired, 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 4004 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

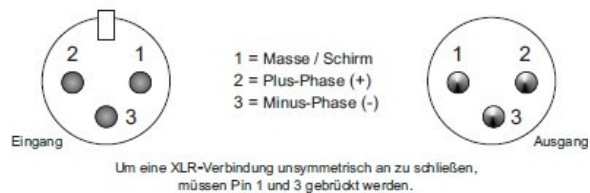
If the amplifier is operated on a power generator, this is done at your own risk!

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 symmetrically and asymmetrically. Balanced cables are preferable, however, as they provide better protection against interference over long cable runs. As explained on page 18, only certain XLR inputs are used depending on the operating mode of the power amplifier. The operating mode of the device can be set using the menu navigation via the encoder wheel or by loading the respective preset using the software. The inputs Input A and Input B can be controlled with signals up to +24dBu. The connection between power amplifier blocks 1 and 2 can be easily established using short XLR link cables (0.5m). In addition, the user has the option of further processing the fed-in XLR signals via the XLR Out socket, e.g. in another PowerPac 4004 DSP. Pay attention to the following assignment of the XLR connection.



Speaker connection

Before loudspeakers are connected to the Speakon® outputs of the PowerPac 4004 DSP, the corresponding preset must be loaded on the signal processor! Only with the specially designed presets developed by PL-AUDIO, your connected loudspeakers achieve maximum performance, the best possible sound and the necessary operational reliability. Loading an incorrect preset will cause the speakers to sound bad and/or may be damaged by overloading! If you would like to operate loudspeakers from other manufacturers on the PowerPac 4004 DSP, there are sufficient free preset storage spaces available on the device! As a starting point, we recommend the "01. Load Sub + Top Standard" preset and adjust it to your speakers (Gain, HPF, LPF, EQ, Limiter, etc.) The Speakon® sockets (7, black) on the back of the device (page 8, bottom picture) are intended for system cabling. When wiring the system, only a single 4-pin Speakon® cable is laid between the power amplifier and a sub/top combination on each side of the system. Pins 1+/1- are wired for the tops, pins 2+/2- for the bass.

2-way actively separated loudspeakers do not have a built-in passive crossover. With these loudspeakers, each playback path has its own amplifier channel (BiAmp). An amplifier channel drives the midrange driver(s) (e.g. channel 2 – mid). Another amplifier channel the tweeter(s) (e.g. channel 3 - high). With this system, a 4-pin Speakon® cable is used between the Speakon® sockets (8, red) and the speaker box. Channel 2 is transmitted to pins 1+/1-, channel 3 is transmitted to pins 2+/2-. Special care must be taken when wiring bi-amp systems, as incorrect wiring can quickly lead to the destruction of the high-frequency driver! The correct selection of the preset is also important here.

PL-Audio Bi-Amp presets are usually locked in the signal processor with password protection to prevent the parameters from being changed unintentionally. If you want to make changes here, do this very carefully, with caution and expertise! The signal processor allows very fine, but also serious changes in the transmission properties of the speaker system! To change the bi-amp presets, log in to the administrator user level of the signal processor with the password: "admin1". Now you have full access.

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

Bridge Mode Operation

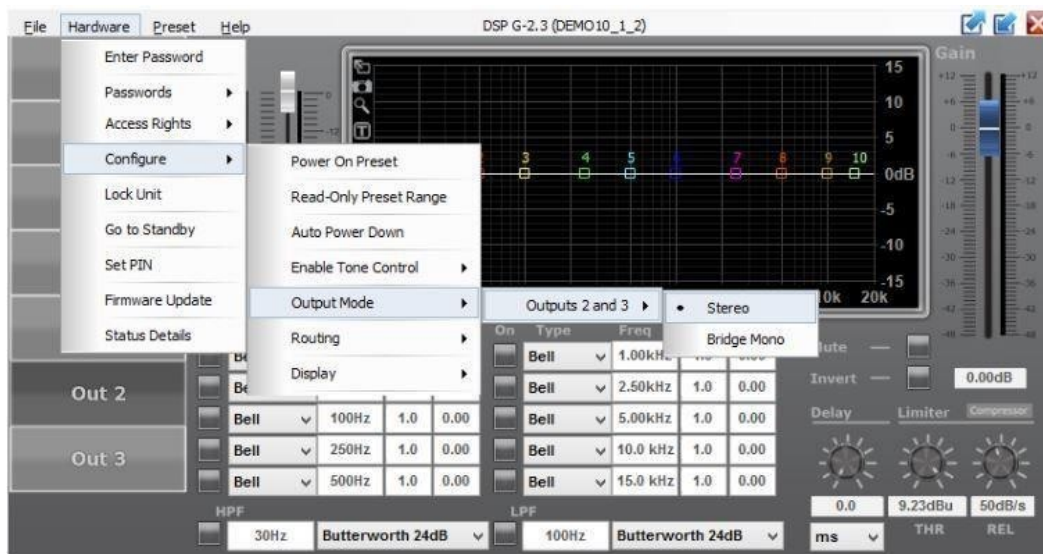
The bridge operation (BTL) couples the power from channel 2 (800W/4Ω) and channel 3 (800W/4Ω) to a powerful 1x1400W/8Ω mono channel. The maximum impedance is 8Ω, never connect 4Ω loudspeakers! The BTL bridge operation increases the voltage gain from 26dB to 32dB (+6dB)!

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

Setting >BTL-operation

1. Connect the DSP to the PC. Start the software and open the control window.
2. In the **MAIN** window, turn on the blue Link button for channels 2+3 (Link Ch2 & Ch3).
3. Make all of the settings for your speaker at **Out 2** of the DSP.
4. Be sure to calculate the limiter with an amplification 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 2 and 3**
- c) Click on **Bridge Mono**



In the **Bridge-Mono** -mode all buttons of **Out 3** are out of order in the software!

All settings in the DSP controller must be made in Out 2.

Connection of loudspeakers in BTL-Mode :

Use the **red bi-amp socket ONLY** in the connection panel for bridge operation! Make sure that the Speakon connectors are wired properly and are short-circuit-proof.

Bi-Amp connector, red Loudspeaker, 8Ω

- | | | |
|------------------------------|--|--------------------------|
| 1+ Plus pole, Channel 2 (+) | | + Plus pole Loudspeaker |
| 1- Minus pole, Channel 2 (-) | | - Minus pole Loudspeaker |
| 2+ Plus pole, Channel 3 (+) | | |
| 2- Minus pole, Channel 3 (-) | | |

Im Brückenbetrieb niemals Impedanzen mit weniger als 8Ω am Verstärker anschließen!!!

Speaker connection

Important notice: 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

In order to avoid overloading the amplifiers, among other things, only connect ONE Speakon connection® ("System" black or "BiAmp" red) to your loudspeakers!

Damage to the amplifier modules due to overload caused by too low impedances are not covered by the warranty or guarantee!

USB / Network communication

• Page 8 (PowerPac backside, Item 5) USB Interface

You can connect the DSP controller with a commercially available USB cable (USB A to USB B).

Connect your PC or Mac via USB interface to use the PL-audio DSP-CONTROL software to make software configurations and settings.

Please note that the length of USB signal transmission is limited. We only recommend to use USB cables up to a maximum length of 3m.

The USB-Interface is designed as USB 1.1.

If ever possible please preferably use the Ethernet connection (RJ 45 socket).

• Page 8 (PowerPac backside, item 3) 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. 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.

ATTENTION: The power amplifier has no gain control on the front panel!

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.

The setting of all output levels is made in the Digital Signal Processor (DSP) either by using the built in encoder wheel and the display or the PL-audio DSP-Control Software on a computer.

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.

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.

DSP control via Display & Encoder wheel

Note: Certain settings can only be configured using the PL-audio DSP-Control software.

Push the MENÜ-button once to call up the main menuue.

The main menuue contents 5 menuue points:

- Load Presets
- Save Presets
- Password protection / Access Level
- Device informationen read out (5 additiopnal points in this sub menuue)
- Routing, configuration (Input routing to Outputs) Mixer in OUT 1,2,3

By pushing the MENÜ-button you can navigate in the main menuue in an endless loop.

Encoder-wheel turn to select parameters and navigate in the sub menuue.

Encoder-wheel pushing to confirm a setting or to jump to the next module.

EXIT-button: push once to jump back to previous menuue point.

EXIT-button pushing several times to exit the configuration menuue and take over the changed parameters.



Upper line: Name of the individual module block **PL-Audio 4004 1**

Lower line: Number of Preset **2** & short description of the preset **B18+F10pro L**

Dual block construction PowerPac 4004 DSP

Since you can call up and control the two power amplifier sections of the PowerPac 4004 DSP individually via the network connection, it is advisable to name the respective blocks accordingly for better clarity, such as top part L and top part R or something similar. This makes wiring, monitoring and control easier and clearer. Any settings in the digital signal processor are NOT automatically adopted by the respective other DSP in the other block. These settings must be made individually for both blocks!

Interlink cabling block 1 to block 2

You can connect each of the power amp sections (Block 1 and Block 2) individually using XLR cables (depending on the mixing console to be fed). To simplify the cabling for stereo applications, we recommend interlink cabling with short XLR cables between THRU left and right of one power amp block to inputs A and B of the other power amp block.

Network connection

If you would like to remotely monitor the two DSPs, for example via W-LAN, connect the respective network connections (RJ 45) of block 1 and block 2 to a suitable router. You can then call up the two DSPs individually on the computer for remote monitoring or settings.

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.

The PowerPac 4004 DSP offers the user numerous possible uses:

The power amp has 2 output channels per power amp block, 2 x 800W 4Ω. This power is provided at the Speakon sockets® in red (bi-amp: Ch 2=1+/1- and Ch 3=2+/2-) or black (system: Ch 3=1+/1- and Ch 2=2+/-). **The signal of DSP channel 1 is only available as a line signal at the balanced XLR out and can be used, for example, to control power amplifiers for subwoofer or full-range operation. The parameters for this are set in the DSP of the PowerPac 4004 DSP.**

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

up to 2 subwoofers at 8 ohms and 2 tops with built-in crossover at 8 ohms.

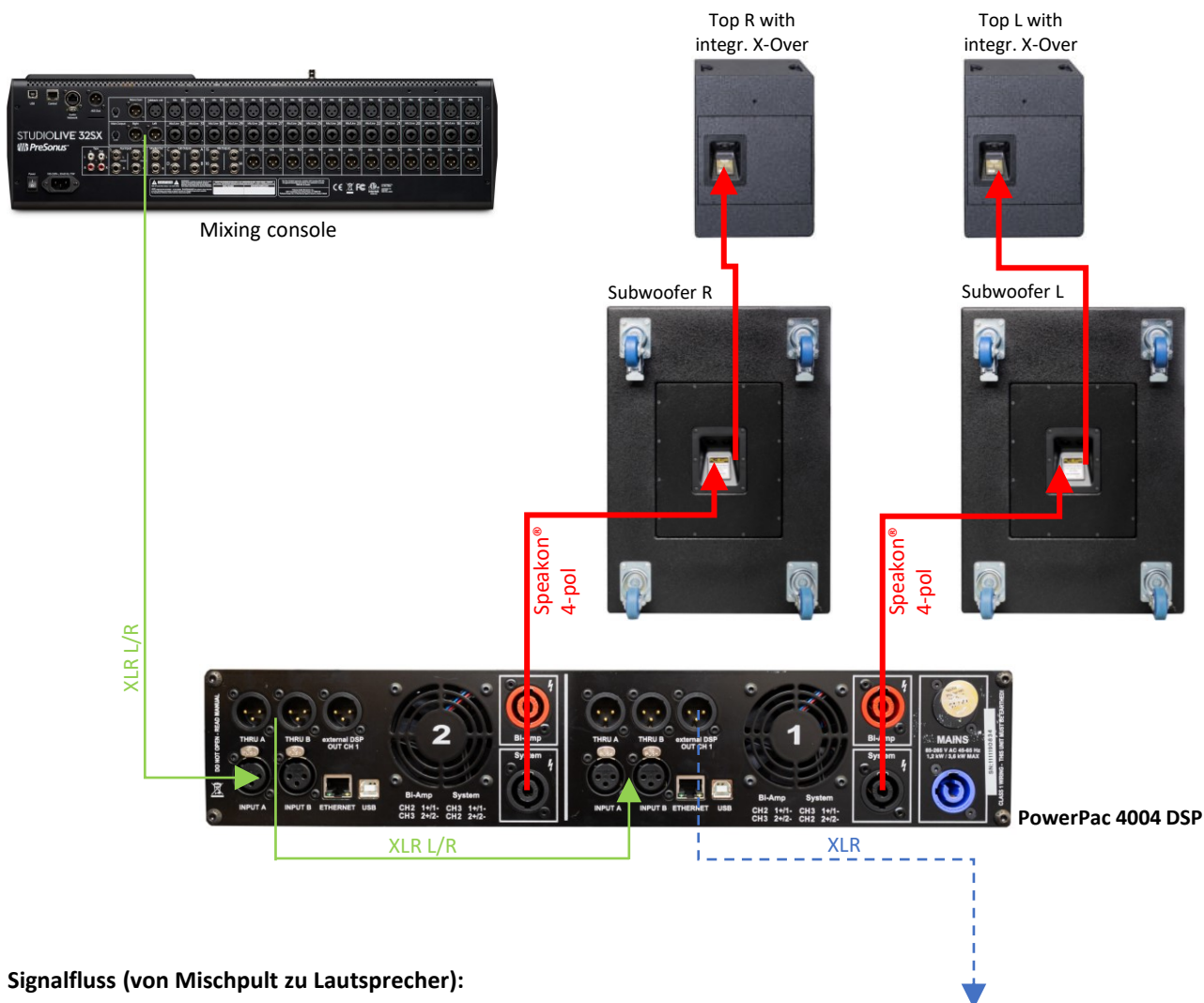
- Bi-amp operation of actively separated mid/high speaker units with mid-range channel (at least 4 ohms) and treble channel (at least 4 ohms)
- up to two monitors with built-in crossover á 8 ohms plus eg two side or front fills á 8 ohms with built-in crossover
- many other combinations (e.g. multi-room or multi-loudspeaker 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 channel 2 of the PowerPac 4004 DSP, it will receive 400W at 8Ω. If you add an additional loudspeaker of 8Ω to channel 2, the impedance is reduced to 4Ω. The 800W (which is available at 4Ω) is now shared between both speakers and each speaker receives 400W at 8Ω. (like application 2) Calculation example: $(400W \ 8\Omega + 400W \ 8\Omega = 800W \ 4\Omega)$. The same principle applies to channel 3 of the PowerPac 4004 DSP.

The most ideal use of the PowerPac 4004 DSP is as a system power amplifier for, eg. actively (bi-amp) controlled loudspeakers (connection via the Speakon sockets® BiAmp red) such as PL-AUDIO LA210/LA208/LA206/BigBanana/Banana/TS62/TS61/ TS42 plus the feed of the signal from the DSP (XLR-Out Out 1) to additional power amplifiers for the corresponding subwoofers (or alternatively to active subwoofers with built-in power amplifiers such as PL-AUDIO Gorilla series, B21Sub AKTIV, B215Sub AKTIV,...). The PowerPac 4004 DSP thus takes over the entire signal management for top parts and the matching subwoofers.

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

Connection example stereo to passive Woofer and Tops:



Signalfluss (von Mischpult zu Lautsprecher):

- XLR Out Mixing console 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 (Interlink)
- Speakon® System Out Block 2 to Subwoofer R (2+/2-)
- Speakon® System Out Block 1 to Subwoofer L (2+/2-)
- Speakon® from Subwoofer R to Top R (1+/1-)
- Speakon® from Subwoofer L to Top L (1+/1-)

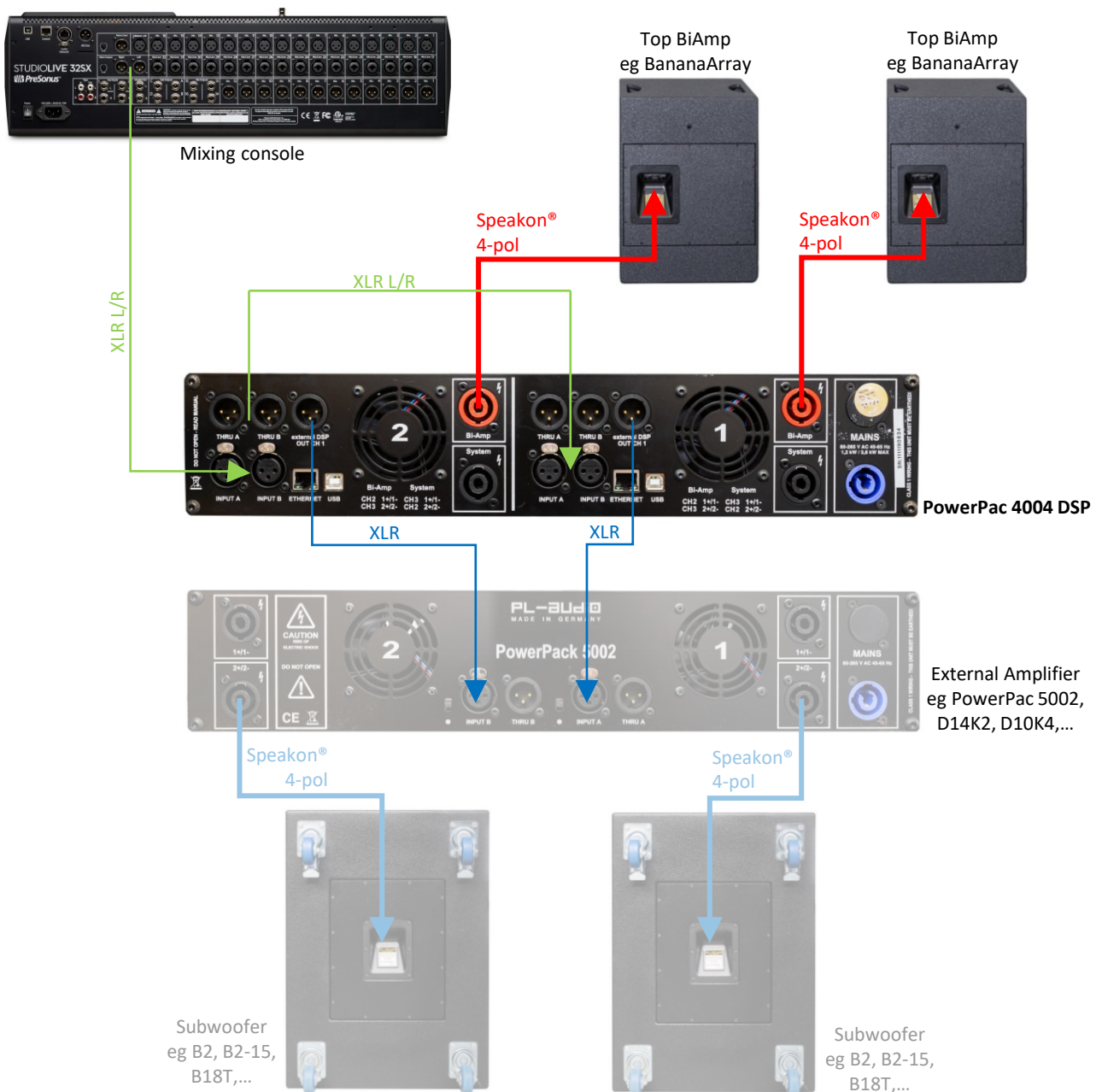
Eg. To external power amplifier with speakers or active speakers for eg. front- or side-fill

In the above example, the PowerPac 4004 DSP supplies up to 2 basses at 8 ohms (800 W) and up to two tops with integrated crossovers at 8 ohms (800 W) per power amp block. For the sake of simplicity, only one subwoofer and one top per side are shown in the example graphic.

Both bass and top parts can be connected to the Speakon socket® "System" via a 4-pole Speakon cable®, with channel 2+/2- transmitting the bass signal and channel 1+/1- transmits the signal to the top parts (mid & high). A built-in crossover takes over the signal assignment to the mid-range driver and tweeter in the top parts.

In the above example, the DSP Out 1 could control the front or side fill via an external amplifier (eg PowerPac 2004). In this case, please note that a signal or level adjustment for DSP Out 1 (front/side fill) only makes sense via the PL-AUDIO Control software, since the signal for this is tapped from the sum input signal.

Connection example stereo to active (BiAmp) Tops, external amplifier and Subwoofer:

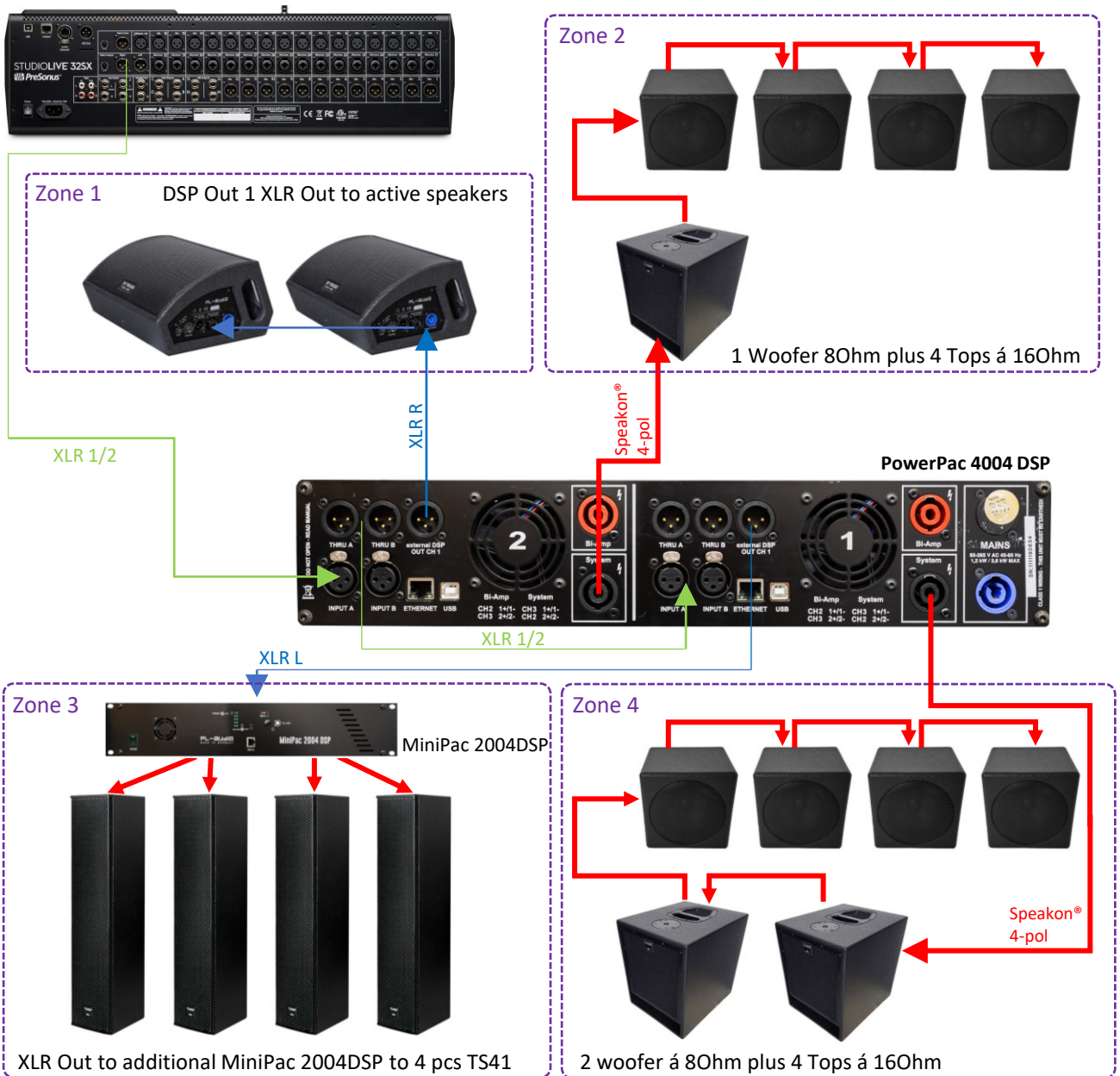


Signal flow (from mixing console to speakers):

- XLR Out mixing console to Input A/B In on Block 2 PowerPac 4004 DSP
- Thru A/B of Block 2 to Input A/B Block 1 PowerPac 4004 DSP (Interlink)
- DSP Out Channel 1 of Block 1&2 to Input A/B external amplifier, eg. PowerPac 5002,...
- Speakon® BiAmp Out Block 2 to BananaArray R
- Speakon® BiAmp Out Block 1 to BananaArray L
- Speakon® of external amplifier 2+/2- to Subwoofer (Block 1 & 2)

In this example, the XLR out of the DSP takes over the signal management for the two subwoofers (here powered by a PowerPac 5002). The two actively separated (BiAmp) tops are powered via DSP channel 2 (midrange) and DSP channel 3 (treble) via the power amplifiers of the PowerPac 4004 DSP driven with up to 800W for the midrange and up to 800W for the treble range via the Speakon socket® "BiAmp".

Multi zone connection:



In the example outlined here, the PowerPac 4004 DSP handles the matrix signal management and supplies up to 2 subwoofers at 8 ohms (800 W) and up to four tops with integrated crossovers at 16 ohms (800 W) per power amplifier block. Both, bass and top parts can be connected to the Speakon socket® "System" via a 4-pole Speakon cable®, whereby channel 2+/2- transmits the bass signal and channel 1+/1- transmits the signal to the top parts (mid & high). The signal assignment to the midrange and tweeter in the tops is handled by a built-in crossover in the respective tops.

In the example above, the speaker groups are divided into different zones. For this example, you will most likely not use the stereo sum of the mixing console, but rather an individual matrix mix on the two inputs A and B or the respective blocks 1 & 2. For individual signal feeds to Blocks 1 & 2, we recommend XLR interlink cabling from Thru A to Input B for each block (bass signal is processed internally by the DSP from the sum of Inputs A and B).

The DSP Out 1 of Block 2 is fed to active loudspeakers (e.g. Flatbox 200) via an XLR connection. The DSP Out 1 of Block 1 is fed to 4 passive loudspeakers (eg TS 41) via an external four-channel amplifier (eg MiniPac 2004 DSP) using an XLR cable. In this case, please note that an individual signal or level adjustment on the output side for DSP Out 1 (Block 1 and Block 2) can only be carried out using the PL-AUDIO Control software, since the signal for the DSP is tapped from the sum input signal.

3.4 Loading and editing of presets on the device / Routing

In the flash memory of the DSP-controller up to 80 presets can be stored. With the encoder wheel and the MENÜ-button the presets can be loaded. Presets can be named with up to 16 characters. Please use NO special characters for naming the presets.

Load preset:

- Push the MENÜ-Button one time
- Choose the desired preset by turning the encoder wheel. The presets stored in the memory will one by one appear on the display.
- For loading the selected preset push the encoder wheel.
- Confirm the appearing security query by turning the encoder wheel to the right until YES will appear in the display with capitalisation.
- By pushing the encoder wheel again the selected preset will be loaded into the DSP.

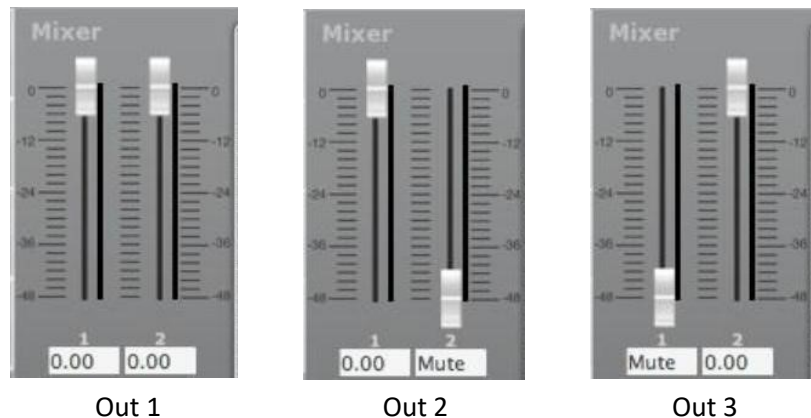
Routing, pre setting (Input to Outputs) Mixer in → Out 1,2,3

By pushing the MENÜ-button five times the sub menu „Routing“ will be called up on the display. This consist of two settings:

- 1) Stereo + Sub
- 2) Mono 3-Way **By selecting 2 (Mono 3-Weg) only XLR-Input A is active!**

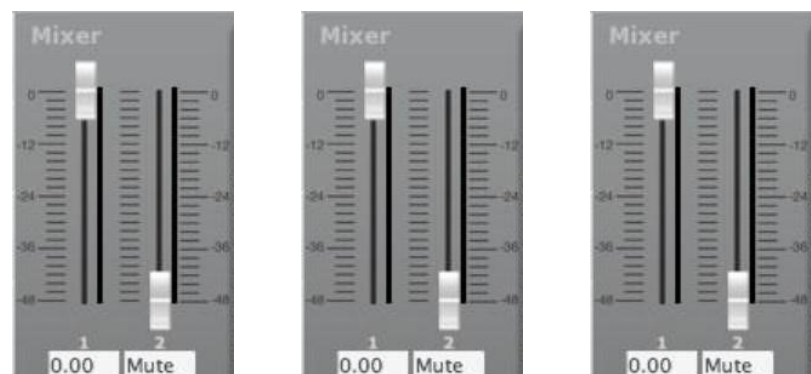
This pre-selection changes the mixer for the signal selection in the outputs 1, 2 and 3.

Stereo + Sub:



Mono 3-way:

ATTENTION: The signal of Out 1 is always low only on the XLR connection "DSP Out Channel 1". The signals from Out 2 and Out 3 are denfed to internal power amplifiers.



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 PowerPac 4004 DSP.

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

Now switch the PowerPac 4004 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 PowerPac 4004 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 PowerPac 4004 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 PowerPac 4004 DSP.

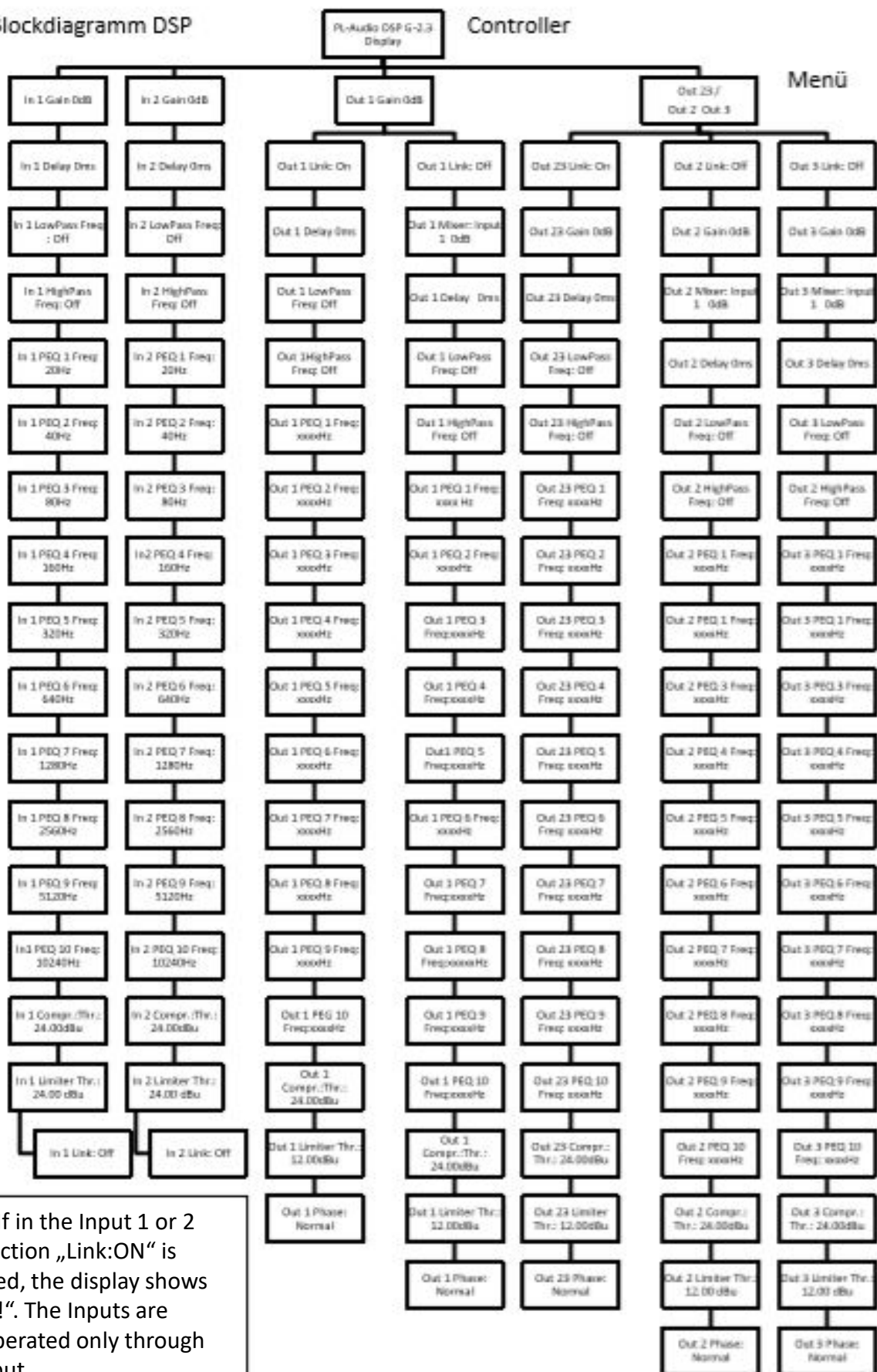
Leave necessary maintainance work, such as cleaning with compressed air, to qualified specialists.

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!

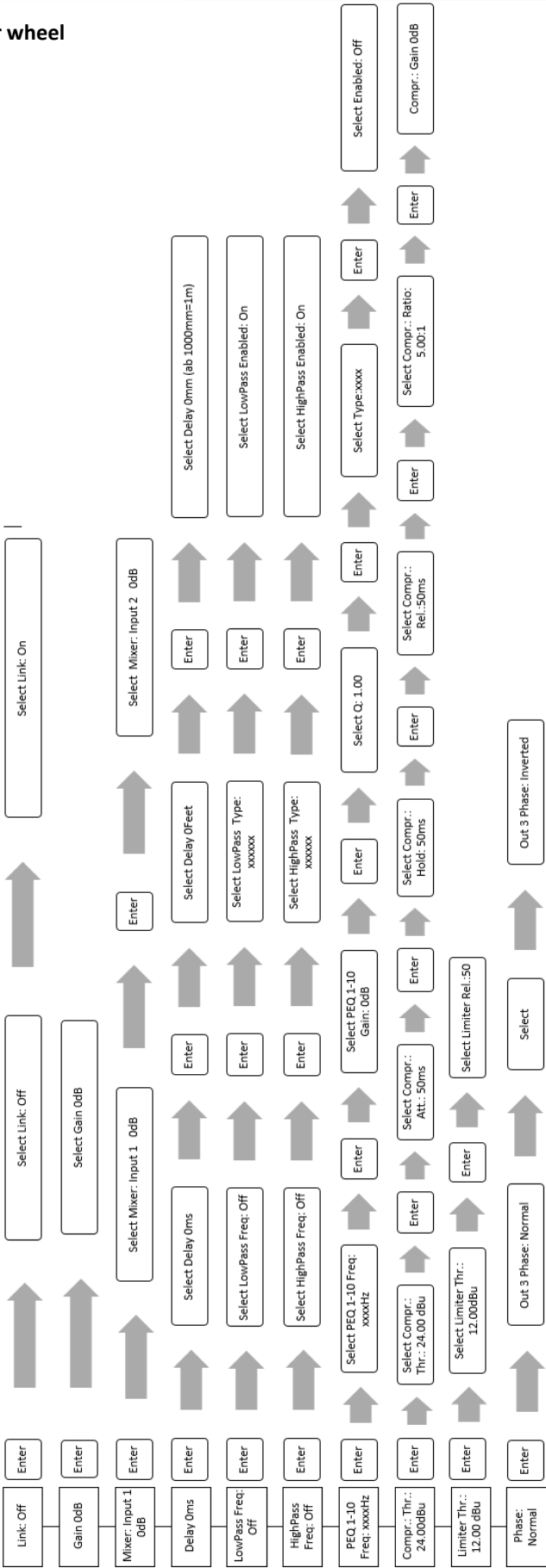
3.2 Blockdiagramm DSP

3.3

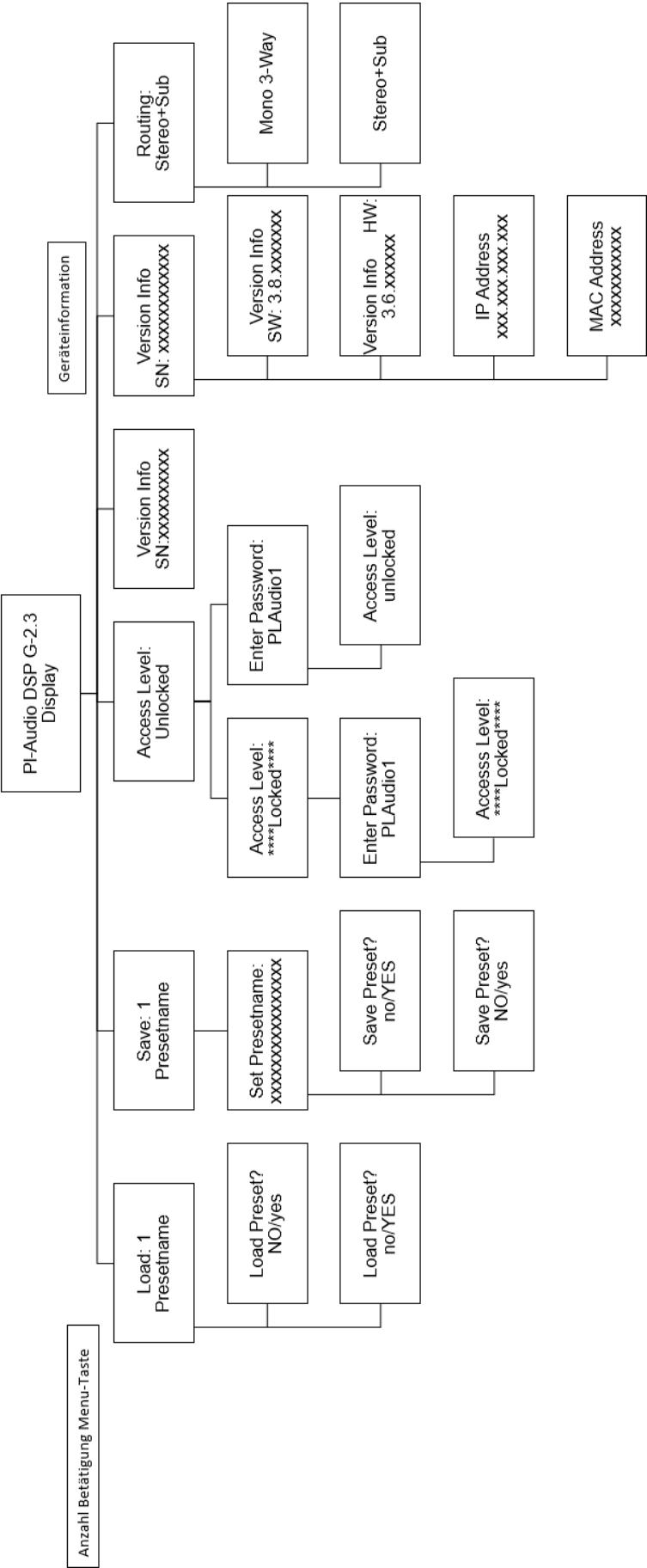


NOTE: If in the Input 1 or 2 the function „Link:ON“ is activated, the display shows „IN 12 !“. The Inputs are then operated only through one Input.

Operating steps via encoder wheel



LCD-Display Menu



Limiter settings

The table below lists the limiter settings for most of the speaker 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.

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