PKN AUDIO

PKN XE-2500DSP / PKN XE-4000DSP
PKN XE-5002DSP
PKN XE-6000DSP / PKN XE-10000DSP

User Manual

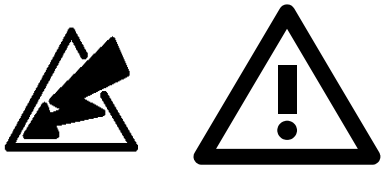
All PKN AUDIO products are designed and made in HUNGARY / EUROPEAN UNION

Table of Contents

1. Specifications

Type		XE-2500DSP	XE-4000DSP	XE-5002DSP	XE-6000DSP	XE-10000DSP
Power Requirements		160V – 270 VAC, 50-60Hz				
Average Power Consumption		2600W	5500W	5650W	7900W	8000W
Soft Starting		Yes (with programmable time delay start-up sequence)				
Power Supply		High Frequency Single-Stage Resonant with High Power-Factor (PFC)				
Mains Connection		Amphenol Powercon				
Working Temperature Range		0 – 40°C				
Storage Temperature Range		-25 - 60°C				
Output Power	@ 16 Ω	2 x 320W	2 x 680W	2 x 490W	2 x 1000W	2x 1300W
	@ 8 Ω	2 x 700W	2 x 1300W	2 x 980W	2 x 1900W	2 x 2600W
	@ 4 Ω	2 x 1300W	2 x 2100W	2 x 1800W	2 x 3650W	2 x 5000W
	@ 2.6 Ω	2 x 1900W	2 x 2000W	2 x 2600W	2 x 3000W	2 x 3200W
	@ 2 Ω **	2 x 1500W	2 x 1800W	2 x 3200W	2 x 2200W	2 x 3600W
Frequency Response (+/- 3dB, 8 Ohms)		5 Hz - 20 kHz				
Damping Factor		>400	>500	<550	>600	>700
Slew Rate ***		50V / us			60V / us	62V / us
End-Stages		High Frequency Semi-Soft Switched PWM in Balanced Configuration				
Output Connections		Four Pole Amphenol SPEAKON (1+2+ in parallel, 1-2- in paralel)				
Signal-To-Noise Ratio		100dB	102dB	101dB	107dB	105dB
Nominal Input Sensitivity for Maximum Output Level (Balanced)		1.4Vrms	1.7Vrms	1.5Vrms	1.7Vrms	1.9Vrms
Input Impedance (Referred to ground)		10 KOhms + 10 KOhms (+/- 1%)				
CMRR		>100dB				
Input Connectors		Amphenol XLR				
DSP Features		HPF, LPF, PEQ, Delay, Phase Invertion, FIR Filter, Compressor, Limiter, Expander, Ducker, Noise Gate, Signal Generator, Feedback Eliminator, Auto Mixer				
DSP Presets		Up to 20 Custom User Presets + 1 Factory Default				
DSP Sample Rate | Bit Depth		48/96kHz | 16/24/32Bit				
Digital Audio Stream Compliances		AES67 / ST2110-30 / Ravenna				
Digital Channels		2 Ch In / 2 Ch Out via Ethernet				
DSP & Digital Audio Latency		1-5ms (Adjustable)				
Built in Limiters (Non-DSP)		Output: Adjustable Advanced Limiter (1V / Step), Adjustable „Limiter Wizard” (Impedance/Wattage) Input: Compressor Limiter (Non-adjustable, factory set to maximum input sensitivity for ADC protection)				
Advanced Limiter Settings		10 - 100V	10 - 155V	10 - 126V	10 - 170V	10 - 200V
Indicators		LEDbar, status LEDs (AGR, Short, Temp, Protect, Ready), Graphics Display				
Display		Graphical LCD				
Control Terminals		JOG Wheels, Buttons, PKN Audio DSP Control Software				
Volume Control		-95,5dB – 0dB Set by Control JOG Wheels (0,5 dB / Step) | (Independently) PKN Audio DSP Control Software				
Input Sensitivity		-95,5dB – 0dB Set by Control JOG Wheels (0,5 dB / Step) | (Independently) PKN Audio DSP Control Software				
User Profiles		5 User Profiles				
Protections		Analog Input Limiter, Short Circuit, Overload, Low Impedance, Thermal, DC Fault				
Cooling		Active Air Cooling with Regulated DC Fans				
Direction of Airflow		Front to Rear				
Remote Control		10/100/1000 Mbps Ethernet, PKN Audio DSP Control Software				
Weight		8Kg	9Kg	9.1Kg	9.5Kg	9.6Kg
External Dimensions		19" Rack 483 x 440 x 44mm (1RU)				

2. Safety Warnings



The lightning bolt triangle is used to alert the users to the risk of electric shock.
The exclamation point triangle is used to alert the users to important operating or maintenance instructions.

WARNING: TO REDUCE THE RISK OF ELECTRIC SHOCK OR FIRE, DO NOT EXPOSE THIS DEVICE TO RAIN OR MOISTURE!

This unit must be grounded!

Install the amplifier in a well-ventilated location where it will not be exposed to high temperature or humidity.
Do not install the amplifier in a location that is exposed to direct rays of the sun, or near to hot appliances or radiators.

DO NOT BLOCK FRONT OR REAR AIR VENTILLATORS!

DO NOT OPEN! DANGER! HAZARDOUS ENERGY!
Servicing is required when the device is unoperational, or has been damaged in any way.

Please refer all servicing to qualified service personel!

CAUTION! HIGH MAGNETIC FIELDS!

DO NOT locate sensitive high-gain equipment such as preamplifiers, DSPs, EQ, tape decks etc. directly above or below the unit. Since this digital amplifier has a high power density, it has a strong magnetic field, which can induce hum into unshielded devices that are located nearby. The field is strongest just above and below the unit. If an equipment rack is used, we recommend locating the amplifiers in the bottom of the rack and the sensitive equipments at the top.

SPEAKER OUTPUT SHOCK HAZARD!

These digital power amplifiers are capable of producing hazardous output voltages. To avoid electrical shock, do no touch any exposed speaker wiring while the amplifiers are operating.

If you have any questions, contact your PKN Audio dealer, or write us an e-mail: info@pknaudio.com

3. Installation Informations

Our amplifiers work with very high power levels, therefore the perfect installation is essential for both efficiency and security reasons.

Unproper installation may cause serious injuiry or fire hazard!

WARNING: NEVER CONNECT THE OUTPUT TO A POWER SUPPLY, GROUND, OR TO EACH OTHER, TO AVOID ELECTRICAL SHOCK OR FIRE.

Due to strong induced magnetic fields, do not locate sensitive, high-gain equipment such as preamplifiers, DSPs, EQ, tape decks etc. directly above or below the unit. The field is strongest just above and below the unit. If an equipment rack is used, we recommend locating the amplifiers in the bottom of the rack and the sensitive equipments at the top.

The output peak currents could exceed 100 Ampers, therefore use only high quality connectors and cables, with proper insulation and conductive cross-section areas.

Using smaller current capacity wiring than recommended may cause the wirings to overheat, or even fire.

Please check the following table, for minimum output cable requirements:

	XE-2500DSP	XE-4000DSP	XE-5002DSP	XE-6000DSP	XE-10000DSP
Peak Output Voltage	~110Vp	~170Vp	~150Vp	~200Vp	~225Vp
Peak Output Current @ 2 Ohm	>50A		>60A		
A min @ 16Ohm l<10m	1.5mm^2	1.5mm^2	1.5mm^2	1.5mm^2	2.5mm^2
A min @ 8Ohm l<10m	1.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	4mm^2
A min @ 4Ohm l<10m	2.5mm^2	4mm^2	6mm^2	6mm^2	6mm^2
A min @ 4Ohm 10m<l<50m	4mm^2	5mm^2	6mm^2	6mm^2	6mm^2 ++

Inputs:

The PKN XE series amplifiers have balanced analog signal inputs for improved sound quality characteristics.

For sound quality reasons, use only symmetrical wiring for the amplifier inputs in case of higher disistances than 1,5m. A balanced line is far less prone to noise, than unbalanced methods.
However if you want to use any unbalanced method you have to make a connection between pin3 and 1 of XLR input connector and account with double input signal levels to achieve the same output levels.

Caution! The maximum input level of the +/- pins referred to the Ground should never exceed 15V!
Higher levels will damage the input stage of the amplifier!

The XE-DSP Series can utilise the Ethernet connector as an AES67 compliant digital audio in-and-output.
We recommend the use of cables that are at least Cat5e compliant for this application.
When using a switch, make sure it supports at least 1000Mbps bandwidth for stable usage.

Outputs:

Caution! At high power levels there is a strong magnetic field near the output cables. Be careful when placing the output wires, and keep them as far as possible from sensitive low-signal equipments.

Do not mount the output cables together with wires which can carry sensitive, low-level signals, such as microphones, etc.

Never make loops with the common wires of the output cables, If you have separated wires use twisted pairs, reducing loop size.

The maximum output signal level is always set by a configureable limiter.

When the **AGR** (Automatic Gain Reduction) LED lights up, it signs that the limiter is in action. The duration of AGR light is directly related to the signal compression ratio. The longer it is lit, the more compression is applied.

The limiter stage is continuously reducing the voltage amplification while every component of the signal gets compressed into the previously set Voltage margins.

4. Rear Panel

4.1 230V AC Input

230 VAC main connector (POWERCON)

The AC Main connection is made via AMPHENOL POWERCON connector on the rear side of the device. Always check the connector, and the cable before use it! If you find any damage, please consult an electrician for replacement it.

It's very important to connect the ground for safety, never use adapters that disable the ground!

Powercon Pinout:

L	**Phase**
PE	**Ground**
N	**Neutral**

4.2 Cooling

DO NOT block the front or rear air ventillation openings!
When using an equipment rack, mount units directly on top of each other.
Close any open spaces in the rack with blank panels!
The side walls of the rack should be a minimum of one inches (2,5 cm) away from the amplifier sides, and the back of the rack should be open. The airflow's direction is front to rear.

After turning on the amplifier, the cooling fans run on 100% speed for at least 5s, then the speed decreases to a lower level. This way you can check if every cooling fan is operational.
Once signal and load is applied, the speed of fans are controlled in an intelligent manner, depending on the actual internal temperature and load conditions.

4.3 Inputs

Channel A,B inputs (XLRs male/female paralell)

Input connectors are made via AMPHENOL 3-pin XLR male/female connectors.
You can use both configuration (balanced and unbalanced line), but you must consider that a long unbalanced line can introduce noise to the audio quality.

Input sensitivity:

XE-2500DSP	XE-4000DSP	XE-5002DSP	XE-6000DSP	XE-10000DSP
1.4Vrms	1.7Vrms	1.5Vrms	1.7Vrms	1.9Vrms

Input impedance: 10 KOhms + 10 KOhms (+/- 1%)
Pinout of input connectors:

GROUND	**PIN 1**	**Ground/Shielding**
POS.	**PIN 2**	**Symmetrical +**
NEG.	**PIN 3**	**Symmetrical -**

4.4 Outputs

Channel A,B outputs (SPEAKON)

Output connectors are made via AMPHENOL SPEAKON connectors. Please check the 3. Installation Informations table to minimize power and damping factor losses of the speaker cables.

Recommended load impedance range is: 2 Ω – 16 Ω

With most devices, please note that on lower than recommended impedances (< 4 Ω) due to the conductive losses of the output wires, the overall damping factor and the efficiency can decrease. With too low impedance, several protective functions of the amplifier can activate sooner.
Higher loading impedances are always better in the aspects of sound quality and efficiency. Use higher output impedances, if possible.

Warning: There are lethal voltages at the loudspeaker connectors when the amplifier is turned on. To prevent any damages turn the amplifier off before connecting the loudspeakers.

The output connectors pinout:

POS.	**1+, 2+ paralell**	**Positive Output**
NEG.	**1-, 2- paralell**	**Negative Output**

4.5 DSP / AES67 Ethernet

Gigabit RJ45 Connector

The embedded DSP module can utilize the ethernet connector as a digital audio In and Output, along with the possibility to control every DSP function and analog/digital audio routing via the **PKN Audio DSP Software**!

You can download the latest software from Our Website!

Make sure to read the **DSP Software Manual**, for all DSP functions and informations about your device's full potential!

5. Front Panel

5.1. POWER: *Standby Switch*

It is swithes the device between ON or STANDBY.
WARNING! If the device's mains power is plugged in, even if the device is in STANDBY, the power supply is still working! DO NOT OPEN THE COVERS!

5.2. TEMP: Overheat Status LED

It doesn't light or flash normally, only when the temperature of the endstage/power supply's heatsink is above 75 °C. In this case the TEMP LED starts flashing, and the maximum output power of the amplifier is decreases by 10%, above 80 °C the flashing becomes faster and the power is further decreased by 33%.
If the power decrease cannot cool back the heatsink under 90 °C the endstage will be muted for safety reasons.

In case of overheat muting the TEMP LED is continously lit, and the OVERHEATING fault window appears on the display.
When the temperature decreases under 80 °C the endstage automatically turns back on.
In any case of TEMP overheat protection activation, troubleshooting is necessary.

5.3. PROT: Short Circuit/Overload Protection LED

When the speaker impedance is so low that it becomes dangerous to the correct operation of the device, the problematic output will be muted.
This state is shown by the PROT LED being lit, and SHORT CIRCUIT fault window appears on the display.

The method of this protection can be chosen from the menu (automatic unmute, or remain muted until action).
This can help the technician troubleshoot the reason of the fault.
In case one channel becomes muted due to short circuit/overload protection, the other channel still works.

5.4. READY A / B: Endstage Status LED

It shows the state of endstage. The LED is controlled by the main microprocessor.
After switching on, both channels' status LEDs have to light up for 5s.

5.5. *LCD Display + Power Meter*

Herre you can see the actual parameters on the screen and you can configure various device functions (volumes, limiters, etc.). The power meter LEDbars show the actual output peak voltages in dB.

5.6. AGR: *Automatic Gain Reduction LED*

When the input level of the amplifier is higher than the limiter's specified value, the input stage decreases the gain until every component of the input signal will be in the safe output range. With this method, it can be ensured that the output signal won't suffer any distorsion, due to input signal fault. This feature is a sort of dynamic compressor / limiter, too.

If you want to use the absolute maximum power of the amplifier, it's optimal when the AGR LED flashes at the peak of the input signal. If the AGR LED is continously lit, it can be a warning of overload, although the amplifier is still able to reduce the gain up until ~5Vrms input voltage.

6. Function Shortcuts

6.1. Volume Setting

Use the JOG wheels to adjust the volume settings. You can set the volumes per channels or both channels.
Channel A – left JOG
Channel B – right JOG.
If you want to set the values both channels, please activate the Ganging feature (6.2).

You can set the volume range from -95.5 dB to 0 dB (in 0.5 dB steps)

6.2. Ganging Channels

You can set the channels to Ganging. Press and hold the JOG wheel for 3 seconds, and choose the Ganging mode. (Yes – Ganging active, No – Ganging off).
If the ganging mode is active, you can set the following parameters for both channels:

- Volume
- Input Sensitivity
- Advanced Limiter Voltage

6.3. Mute

To toggle muting/unmuting of both channels, press and hold the UP button for 3 seconds.
Note: If the device lock is activated, this function doesn't work!

6.4. Information Screens

Our devices have multiple information screens about output voltages, currents, temperatures, and more. You can reach these from the Main View, by pressing the DOWN button. Here you can switch between multiple views by pressing DOWN until you're back to the Main View.
For more details see 7.5. Information Panels

6.5. Back to the Main View

Push the ESC button to go back to the Main View.

6.6. Entering the Menu

Press the UP button to enter the menu.
Note: Locking the device prevents anyone from entering the menu without the DEVICE LOCK code!

6.7. Navigating the Menusystem

You can move the cursor, and/or modify values with the UP/DOWN buttons and the JOG wheels.
For "Enter/Set" press the JOG wheels.

6.8. Clear Faults

Fault messages can be dismissed by pressing either JOG wheels (in case of short circuit, DC fault, etc).

7. Main Display

7.1 Informations on the Main View

- Channel A/B actual volume settings
- Actual highest temperature (Power Supply or Endstage heatsink)
- Actual speaker impedance (above 500W)
- Actual power output (above 500W)

7.2. Volume Setting

The Main View always shows the actually set volume from -95.5 dB to 0 dB.
To set the volume use either JOG wheels on the front panel. The left JOG is channel A, right side is channel B.
In case of ganging the displayed value is for both channels, and modifying the volume with either JOG wheels will change both channel's volume. The set values will be stored in the actual profile which will be kept even after switching off the device, and starting up again.

Note that the volume parameters you can modify remotely from the control software is entirely separate from this menu.

7.3. Mute with Function Shortcut

Press and hold the MUTE button for 3 seconds to mute both channels. The display willl show the screen below. The volume values still can be changed.

Press and hold it again to disable muting.
Channels can be muted separately, see 8.2. Mute

7.4. Ganging Channels

Press and hold one of the JOG wheels for 3 sec, then choose the appropriate option. (YES – ganging channels ON, NO – ganging channels OFF). When you turn this service on, the parameters of both channels will be set in the same time. (volume level, input sensitivity, limiter, etc).

7.5. Information Panels

Press the DOWN button to open the first information panel. Pressing DOWN again will scroll to the next information panel. If you want to go back to the main screen, press the ESC button.

The device has multiple information panels to help configuration:

7.5.1. Output Voltages

Values:

PEAK A	-	Ch. A PEAK Output Voltage
AVG A	-	Ch. A AVERAGE Output Voltage
PEAK B	-	Ch. B PEAK Output Voltage
AVG B	-	Ch. B AVERAGE Output Voltage

If the PEAK A and/or PEAK B, and those channels' corresponding output voltages invert, it means the input limiter is in effect:

The input limiters are set to each amplifier's corresponding maximum input voltages.

7.5.2. Output Current / Workhour

Values:

CURR A	-	Ch. A Peak current
CURR B	-	Ch. B Peak current
Working time:	-	Device total uptime (day : hour : minute : second)
Device lock:	-	Device lock state (on / off)

7.5.3. Power Supply / Temperatures

Values:

ACIN	-	Actual MAINS Voltage
FAN	-	Actual FAN Speed (%)
TEMP A	-	Endstage Heatsink Temperature (°C)
TEMP B	-	Power Supply Heatsink Temperature (°C)

7.5.4. Temperature Profiles

In this view you can see the past 2 hours' temperature levels of the Power Supply's, and the Endstage's heatsinks. The graph shows values between 0°C and 90 °C.

7.5.5. ~~Local Network Parameters~~

This view is not relevant in the XE-DSP Series, and is a placeholder for future updates!

7.6 Fault Windows:

7.6.1. Short Circuit Fault window

Press ENTER (JOG wheel) to clear the fault window.

7.6.2. Overheat window

You cannot dismiss this message until the temperature becomes lower than 80 °C. Both outputs are muted in this state. Once the temperatures are nominal, the device automatically unmutes, and this message disappears.

7.6.3. DC Fault window

If the device output is detected as DC voltage, the protection disables the endstage. **If you see these window after power on, please refer to qualified service personel!**

8. Menusystem

Press the MENU button to enter the menusystem.
If the device lock is active, you will need the device unlock code to continue!

8.1. Limiter Settings

With the help of the limiter features, the maximal output peak voltage can be defined, protecting your equipment from unintentional damage.

If you open the Limiter Settings menu, you have two options:

8.1.1. Limiter Wizard

You can set the selected channel's peak voltages in relation to your impedance in Ohm (left JOG) and desired power in Wattage (right JOG).
The wizard will automatically calculate the optimal maximum voltages, depending on these two parameters.

8.1.2. Advanced Limiter

If the channels are not ganged, you can set Ch. A maximum voltages with the left JOG and Ch. B with the right JOG. If channels are ganged, either of the jogs will set both channel's voltage limits.

Pressing the jog (ENTER) will save the limiter settings and store it in the current profile for both limiters.

The minimum value is 10 V for the limiter for all devices, the maximum depends on the device type:

Type	*Minimum*	*Maximum*
XE-2500DSP	10 V	100 V
XE-4000DSP	10 V	155 V
XE-5002DSP	10 V	130 V
XE-6000DSP	10 V	170 V
XE-10000DSP	10 V	200 V

8.2. Mute

To Enable or Disable separate channel muting (not both channels via function shortcut) you have to enter the menu, then press either JOGs on MUTE CHA or MUTE CHB options.
The flag at the end of the corresponding channel, shows if MUTE is enabled.

Ch. A Mute OFF

Ch. A Mute ON

8.3. DSP Enable

You can Enable or Disable the DSP and its audio signal routing (via an internal, physical relay).

Disabling the DSP will render the device similar to an XE-Series Class-D amplifier. This way the analog input signal is directly routed to the analog output through the amplifier's internal circuits, bypassing any and all Analog-Digital and Digital-Analog audio conversion, along with the Digital Audio routings.

A small icon on the main view shows that the DSP is enabled:

8.4. Input Sensitivity Setting

You can modify the input sensitivity to be in accordance with the input signal source.
The input sensitivity can be set for each channels separately (unless ganging is active).

The changes are set immediately and saved in the current profile.

8.5. Short Circuit Protection Settings

There are two modes of handling a Short Circuit Protection:

- If AUTOSTART is set to NO - After a short circuit occurs, the affected channel stays in MUTE until the protection pop up window is dismissed.
- If AUTOSTART is set to YES - The affected channel's endstage is automatically UNMUTED once the short circuit event ceases with a 5 second delay, up until the 5th occurrance. After the 5th occurrance, the affected channel stays in MUTE until the protection pop up window is dismissed.

8.6. Control Panel → Adjust Display Contrast

You can set the display's contrast with the JOG wheels in the ADJUST CONTRAST menu. The changes are set immediately and stored in the settings of the actual profile.

8.7. ~~Control Panel → Remote Mode~~

This menu is non-functional in the XE-DSP Series, and is a placeholder for future upgrades!

8.8. ~~Control Panel → Network Settings~~

This menu is non-functional in the XE-DSP Series, and is a placeholder for future upgrades!

8.9. Profiles

The device has five user profiles. With these profiles you can store 5 independent install parameters. All changed parameters are stored in the currently selected profile!

Press either JOGs (ENTER) to load the selected profile.

Note that this is entirely independent from the DSP ProgramManage. We're planning implementation of the DSP programs availability from the front panel in a later update!

8.10. Device Lock

Operating the menu and changing any of the parameters can be locked via the Device Lock function.
After locking, you must enter the previously set code to unlock the device. Note that you will have to go back to the device lock menu point and disable the locking feature, otherwise the device remains locked!