PSDSP series

USER'S MANUAL

peecker sound®

SOUND REINFORCEMENT | CONTROLLED RADIATION | ACOUSTIC RESEARCH

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1. IMPORTANT SAFETY INSTRUCTIONS

This symbol indicates *key operating instructions and information* requiring particular attention for correct use of the product.

This symbol warns of *dangerous voltage* and the consequent risk of electric shock. Take extra care and proceed with caution.

1. Read carefully all the attached product documentation and keep for further reference.
2. Heed the warnings.
3. Keep the packaging and check that all the material is in perfect condition.
4. Do not use the product in the vicinity of water nor pour water or any other liquid on the amplifier. Take care not to use it with wet hands or with your feet in water.
5. Do not use near sources of heat such as radiators, stoves or other heat-producing devices.
6. Check that the power cable is intact and undamaged. Do not tread on the cable and take care not to put any pressure on the plug.
7. Connect the plug to a properly earthed electric socket. Do not tamper with the plug. Should the plug supplied not fit your socket, get an electrician to replace it with the correct one.
8. Connect to the mains supply having identical voltage as that indicated on the back of the amplifier.
9. Install the amplifier in compliance with the instructions.
10. Do not obstruct the air ducts.
11. Disconnect the appliance in case of weather storms or when not in use.
12. Wire exclusively as shown in the instructions.
13. Do not remove the upper or lower amplifier covers as this would expose the user to the risk of electric shock.

CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN

14. Do not attempt to repair the appliance yourself but always seek the assistance of qualified technicians.
15. Do not connect an input signal higher than that indicated in the manual.
16. Do not connect the amplifier output to another channel input.
17. Do not connect the amplifier output to any other power source such as batteries, power supply unit or mains outlets, regardless of whether the amplifier is switched on or off.
18. Clean with a dry cloth only.
19. The product must be handled by qualified technicians when:
    - the power cable or the plug are damaged
    - the product has been exposed to rain or humidity
    - liquid has got inside the unit
    - an object has fallen on the unit
    - the unit has fallen and is damaged
    - the appliance seems to be malfunctioning or is showing a marked change in performance
20. Careful supervision is required if the product is used in the presence of children or by unskilled adults.
21. This appliance may produce sound pressure levels damaging to the hearing. Take the utmost care and do not use the product for long periods of time at high levels or at uncomfortable volume levels. Should you experience any hearing loss or buzzing in your ears, consult an audiometric specialist.

2. DECLARATION OF CONFORMITY

This device complies with the requirements of the *European Electromagnetic Compatibility Directive* 89/336/EEC (and relevant 92/31/EEC amendment), as well as the requirements of the *Low Voltage Directive* 72/23/EEC (and relevant 93/68/EE amendment).
Regulations applied:
EN55103-1 (*Emissions*)
EN55103-2 (*Immunity*)
EN60065, Class I (*Safety*).

RoHS-conform 2002/95/EC

CE

3. WARRANTY

Peecker Sound products are guaranteed against malfunction due to defective materials or workmanship for a specified period of time, starting from the date of original purchase. Should a malfunction occur during the warranty period, the product will be repaired or replaced (at the manufacturer's discretion) free of charge. The shipping costs and related risks, and any loss during shipment to authorized service centres are the responsibility of the customer. The product will be returned to the customer with a carriage forward shipment.

Warranty terms
The warranty covers the appliance under its initial purchase in compliance with the laws in force. The warranty is valid for *3 years*, starting from the date of receipt of the product. Peecker Sound reserves the right, in certain cases, to decide to replace the appliance with another identical or similar product. The warranty is not extended following a product failure. The warranty does not cover any incidental or consequential damages, without limitation, caused to persons or property during any period of inefficiency of the appliance.

Exclusions and limitations
The warranty does not apply to:
- any damage to exterior finishings or surfaces, aesthetic elements, or electric/electronic parts resulting from negligent use of the product;
- malfunction resulting from incorrect or improper use of the product or from transport without due care;
- malfunction resulting from repairs carried out by unauthorized persons or service centres;
- malfunction due to circumstances that cannot be ascribed to manufacturing defects of the appliance;
- plastic or glass parts, bulbs and the like, as well as all that can be regarded as normal wear and tear. As regards circuit components (transistors, diodes, etc.) the general terms set by the original manufacturers apply.

The following are also not covered by the warranty:
- damage caused by accidents, product modifications, negligence or incorrect connection
- damage that occurred during transport
- damage resulting from failure to comply with the instructions contained in the user's manual
- claims based on misrepresentations by the seller and any product whose serial number has been rubbed off, modified or removed.

Receiving warranty service
To receive repair or replacement of the product under warranty, the customer must deliver the product in its original packaging carriage paid to an authorized Peecker Sound service centre together with the relevant proof of purchase, i.e. bill of sale, receipt or invoice.

The warranty service and list of authorized service centres is available at the address below:
Peecker Sound - "After Sales Service"
Via Monti Urali, 29 - 42100 Reggio Emilia (Italy)
Tel: +39 0522 557735 - Fax: +39 0522 391268
E-mail: info@peeckersound.com

Repair or replacement of the product and its return to the customer are the only services provided to the customer. Peecker Sound shall not be held liable to pay incidental or consequential damages including, without limitation, injury to persons or property or loss of use.

Costs paid by Peecker Sound
Peecker Sound will pay for all labour and material expenses necessary for the repairs covered by the warranty. Make sure you keep the original packaging; otherwise, the cost of replacing will be charged to you if necessary. Produce the original invoice to establish the date of purchase.

Do not send the product to the factory without prior authorization. Should shipment of the product be a problem, please contact the service centre, who will deal with it promptly. Otherwise, the customer is responsible for shipment and handling of the product to be repaired and payment of all shipping costs.

Limitation of implicit warranties
All implicit warranties, including guarantee of merchantability and suitability to specific purposes, are limited to the duration of the present warranty. With the exception of certain types of damage, Peecker Sound liability is limited to repairing or replacing, at its discretion, any defective products, with no obligation of compensation for any kind of incidental or consequential damages. In case of any controversy, the court of jurisdiction will be exclusively the Court of Reggio Emilia (RE) – Italy.

4. USER LIABILITY

4.1 Damage to speakers

Check the peak power and continuous power of the speakers at all times.
These amplifiers are extremely powerful and may be potentially dangerous to both speakers and human beings.

Most loudspeakers may be easily damaged or broken, often if they are driven by *bridged* amplifiers. Although the gain may be attenuated by using the controls on the front panel of the amplifier, the maximum power output can still be reached if the input signal is sufficiently high.

4.2 Dangerous output voltage

Amplifiers can generate dangerous output voltage.
Do not touch any exposed speaker cables while the amplifier is operating.

4.3 Radio interferences

A sample of this product has been tested and approved in compliance with the limits set out by the *Electromagnetic Compatibility Directive* (EMC). These limits have been determined in order to provide reasonable protection from dangerous interferences caused by electrical appliances.

Should this product not be installed or used in compliance with the instructions as set out in this manual, it might interfere with other appliances such as radio receivers, for example. There is no guarantee, however, that interferences will not occur in a particular installation.

Should the device interfere with two-way radios (switching the device on and off will allow you to check whether this is the case), you should try to eliminate the interference by adopting one of the following measures:
A) Increase the distance between the appliance and the receiver.
B) Connect the appliance to a socket positioned on a circuit different from which the receiver is connected to.
C) Re-position or move the aerial of the receiver.

Check that the unit complies with the EMC immunity limits (it must carry the CE mark). All electrical appliances sold in the EU must be approved for immunity to electromagnetic fields, high voltage and radio interferences. Seek professional assistance.

5. INTRODUCTION

Congratulations on your choice of a Peecker Sound **PSDSP series** power amplifier and thank you for your confidence in us and our products. Your amplifier has been carefully engineered down to the smallest detail, from component selection to final assembly.

All Peecker Sound products aim for full customer satisfaction and you can rest assured that the product you have chosen uses cutting edge technology.
The amplifiers have been designed in the Sound Corporation Design and Research and Development (R&D) departments paying particular attention to the choice of materials, safety devices and electronic design for the manufacture of a safe, reliable and long-lasting product.

Since inappropriate use of the product can jeopardize its correct operating performance, please ensure that you use it carefully and correctly. Please read this manual carefully: all the information it contains is vitally important for using your appliance safely.

5.1 Unpacking

Inspect the packaging and its contents immediately to check whether there are any signs of damage. After unpacking, inspect the product and any accessories. Should you notice any damage, inform your dealer immediately.
Please keep all the packaging materials, which will be useful for returning the product to Peecker Sound or sending it to one of our authorized Service Centres if the product does not arrive in perfect condition. Use exclusively the original packaging, as it is the best way to protect the appliance from mishandling by the carrier.

Please take care of the environment.
Once the appliance has become obsolete, please dispose of it in the appropriate recycling container.

5.2 Installation

All Peecker Sound **PSDSP series** models can be installed in standard 19" rack units as shown in Figure 2. There are four installation holes on the front panel for optimal securing of the appliance – an important factor in mobile systems.

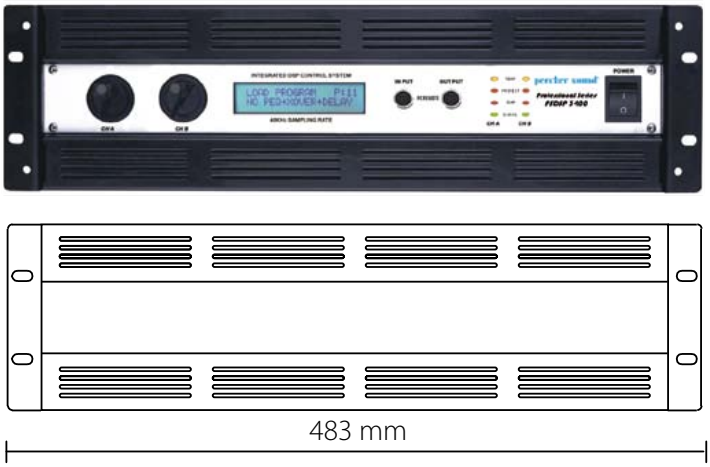


Figure 1a. PSDSP amplifier dimensions (front)

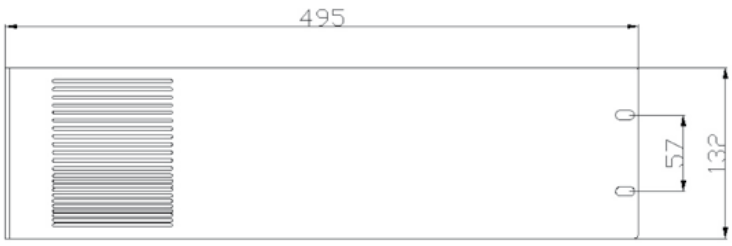


Figure 1b. PSDSP amplifier dimensions (rear)

Figure 2. Flight cases

When moving the equipment with a trolley take extra care not to injure yourself.

Please remember that the amplifier should not be installed in venues with:
- High temperatures
- Dust or excessive humidity
- Intense magnetic fields
- Water in the vicinity of the unit
- Vibrations
- Enclosed spaces that inhibit proper ventilation

5.3 Front panel

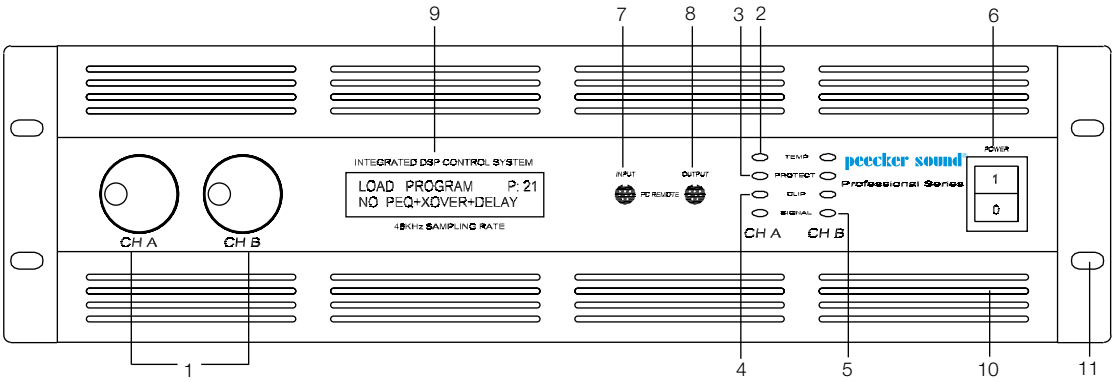


Figure 3. Front panel: PSDSP2000 - PSDSP2600 - PSDSP3400

1. **CHA/CHB** – Precision digital encoders used to adjust the amplification level for channels CHA and CHB and to browse in the DSP menu
2. **Temp** – LED indicator that lights up when the overheat protection is tripped for each channel
3. **Protect** – LED indicator that lights up when the output overload or short circuit protection is tripped for each channel
4. **Clip** – LED indicator for input signal clip point for each channel
5. **Signal** – LED indicator showing the presence of an input signal for each channel
6. **Power** – ON/OFF switch
7. **Input** – PC input interface for setting onboard DSP parameters using PSDSP software
8. **Output** – Output interface to link the PC control signal to the other units. Up to 256 different units can be controlled
9. LCD Display with 2 × 20 characters, showing DSP settings and amplifier status
10. Ventilation grille
11. Holes for standard rack assembly

5.4 Rear Panel

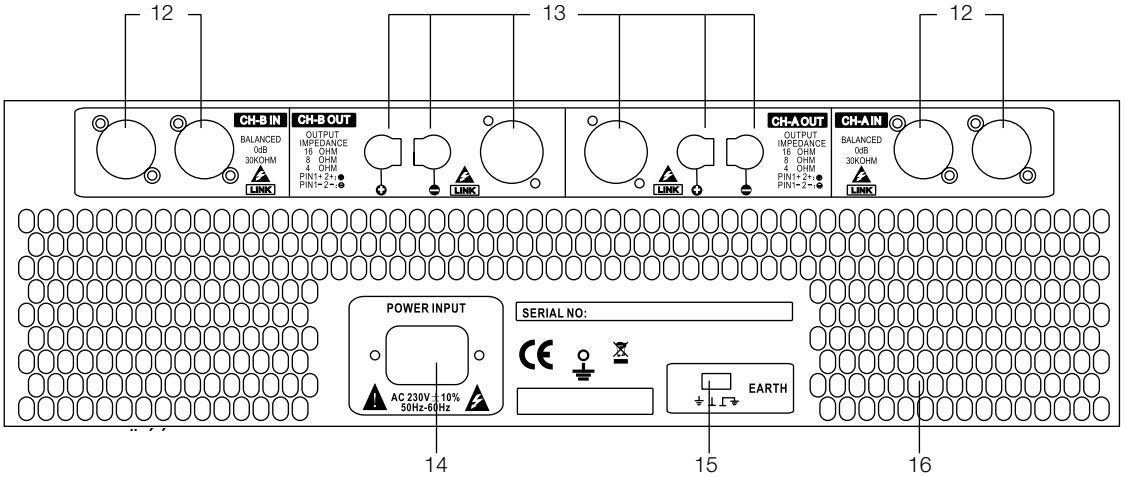


Figure 4. Rear Panel: PSDSP2000 - PSDSP2600 - PSDSP3400

12. **CHA IN/CHB IN** – Balanced inputs (0 dB/30 kΩ) for all models. There are two inputs for each channel with *Neutrik® XLR* connector. The *Neutrik® XLR* male connector is used to set up the signal link
13. **CHA OUT/CHB OUT** - Outputs with *Neutrik® SpeakON* connectors and screw terminals for each channel
14. **Power Input** - IEC 3-pin power supply connector
15. **Earth -** Ground lift switch that allows connection-disconnection of electrical earth to/from mechanical earth
16. Ventilation grille. The cooling fan creates a front-to-rear airflow system whereby cool air is drawn in through the front opening and expelled through the rear opening

6. BRIEF DESCRIPTION OF THE SERIES

The **PSDSP2000**, **PSDSP2600** and **PSDSP3400** models are two-channel stereo amplifiers with a power delivery capacity of 1000 W, 1300 W and 1700 W respectively per channel at 4Ω.
All PSDSP series amplifiers have been designed to meet the specific requirements of the world of professional audio based on criteria of maximum reliability and ease of use.

Once correctly connected to a PC, the DSP (*Digital Signal Processor*) module allows the following parameters to be set: Gain, Equalization, Crossover, Delay, Phase and Limiter. The user friendly interface (*PSDSP*) allows the user to optimize all parameters, all for obtaining the maximum performance. All the configurations can also be viewed in the rear-lit LCD display.

Power delivery remains constant even at high loads, with low heat dissipation and high performance thanks to low-leakage toroidal transformers, which provide an extra margin above the stated nominal output.

Each of the power modules is fully independent in terms of both electrical and thermal protections. Each channel, in fact, is equipped with its own heat sink and independent temperature control which acts directly on the cooling fan.

Plus

- **Multi-application**
- **High-technology**
- **Reliability**
- **High power & efficiency**

PSDSP2000	
Output Power @ 4 Ohm	**2 x 1000 W***
Output Power @ 8 Ohm	**2 x 650 W***

PSDSP2600	
Output Power @ 4 Ohm	**2 x 1300 W***
Output Power @ 8 Ohm	**2 x 850 W***

PSDSP3400	
Output Power @ 4 Ohm	**2 x 1700 W***
Output Power @ 8 Ohm	**2 x 1000 W***

** EIA 1 kHz - 1% THD, both ch.s driven @230 VAC*

7. OPERATING INSTRUCTIONS

7.1 Connection to the AC mains supply and power absorption

Check that your mains power supply is sufficient for the power requirement of your amplifier (consult the data at the end of this manual). Note that the voltage of the electric mains should correspond to the voltage indicated on the back of the amplifier. Maximum current absorption is limited by internal fuses.

Note: Remember that before connecting any of the cables it is always better to switch off and disconnect the amplifier from the power supply. When switching on the amplifier, the volume controls should always be set to the lowest level.

7.2 Cooling

Pay particular attention to the amplifier ventilation/cooling conditions.

An internal system of forced airflow by means of a variable speed fan allows the heat sinks to cool down from the heat generated by power parts. The air flows from the front panel of the amplifier to its rear panel, so that the air is drawn in from the front opening and let out through the rear opening. Ensure that there is sufficient space in front of the appliance to allow adequate inflow an outflow of air. With rack installation, make sure there are sufficient openings for air to flow freely through the amplifier.

7.3 Connection cables

To connect the amplifier to the speakers, always use suitable cables to avoid amplifier power dispersion due to inadequate cable section.
When connecting the amplifier to the mixer, only use shielded cables and not electric power cables.
The main inputs and outputs are connected using *Neutrik® XLR* and *Neutrik® SpeakOn* connectors, while screw terminals are used for auxiliary connections. To connect the amplifier to the PC use the cable supplied with the unit.

XLR BAL INPUT/OUTPUT	
Pin 1	GND
Pin 2	HOT +
Pin 3	COLD -

Neutrik® speakON	
Pin 1 +	POS (CH1)
Pin 1 -	NEG (CH1)
Pin 2 +	POS (CH2)
Pin 2 -	NEG (CH2)

Figure 5. Cannon® XLR and Neutrik® SpeakOn connectors

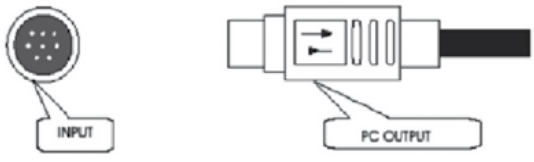


Figure 6. Amplifier-to-PC connection cable

7.4 Stereo configuration

Make sure the unit is switched off before configuring according to your requirements.

To turn on the unit, use the ON/OFF switch located on the right of the front panel. To adjust the volume of individual channels, turn the corresponding ChA/ChB encoders (PSDSP2000-PSDSP2600-PSDSP3400). With audio systems it is always better to switch off the amplifier first. Remember to switch off the amplifier before connecting or disconnecting it to other units and always switch on the mixer first and then the amplifier, in order to avoid peaks that could cause disturbances and may damage the speakers.

• Using in stereo mode (standard)
When using in stereo mode, each channel operates independently and the dedicated input attenuators control the respective channel level.
The recommended minimum load for using in stereo mode is **4 Ω** per channel for all Peecker Sound **PSDSP series** models (see Technical Specifications). To connect the input signal, use the *Neutrik® XLR* connectors on the rear panel. The loudspeaker systems must be connected to the *Neutrik® SpeakOn* output connectors.

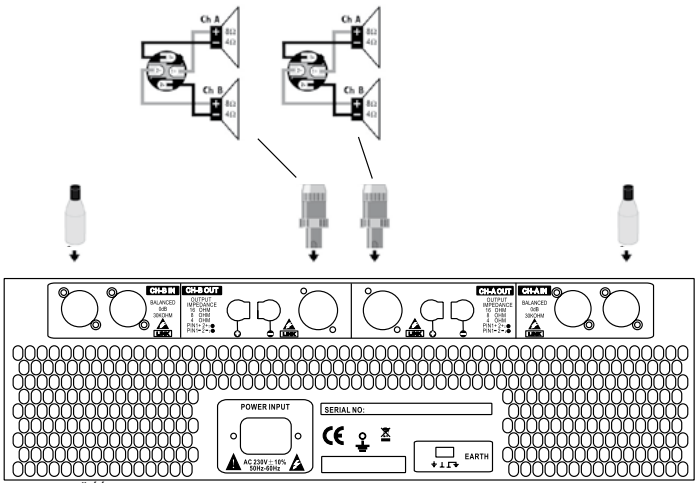


Figure 7. Stereo Mode PSDSP2000 – PSDSP2600 – PSDSP3400

7.5 Offline mode

• Switch-on
The system will go into OFFLINE mode.

• Volume adjustment
Turn the CHA/CHB encoder to set the input level. Press and hold the CHB button for one second to engage or disengage the MUTE of both channels.

• ID (identification number) setting of the amplifier or group of amplifiers
Hold the CHA button down for about 3 seconds and the following will appear on the LCD:

Then turn the CHA encoder to change the amplifier ID, from 1 to 255. Press the button again to save the setting.

• *SUB ADDRESS display (related to the individual amplifier making up a group of more than one amplifier)*

Press and hold the CHA button down (for about 6 seconds) until the amplifier sub address is displayed on the LCD.

FIRMWARE:OSPVS_1.0 *SUBADDRESS:423*

• *Security SETUP*

Press and hold the CHA button down (for about 9 seconds) until the LCD display shows:

SECURITY SETUP

Turn the CHA encoder (ON/OFF) to enable or disenable the protection password. When enabled, all the DSP functions will be blocked.

• *Program loading*

Press and hold the CHB button for about 3 seconds. The LCD display shows:

LOAD PROGRAMP:21 *NOPEQ+XOVER+DELAY*	→ Program Number → Program Name

Then turn the CHB encoder to select the program (1-21). Press the CHB button to save the setting and load the selected program. At the same time, the LCD display below will appear:

LOADING.....

The loading will be completed in a few seconds and the system will return to the main menu.

• *Automatic MUTE*

Press and hold the CHB button for 6 seconds until the LCD display shows:

VOLUME MUTEPROTECT *AUTOMUTE:ON*

Turn the CHB encoder to switch the AUTOMATIC MUTE on or off. Then press the CHB button to save the settings.
AUTO MUTE ON: when the amplifier is turned on, the CHA/CHB volume is automatically in MUTE mode.
AUTO MUTE OFF: when the amplifier is turned on, the CHA/CHB volume returns to the setting of when the amplifier was last switched off.

• *Setup Gain Link*

Press and hold the CHB button for about 9 seconds until the LCD display shows:

GAIN LINK SETUP *ON*

By turning the CHB encoder, the volume LINK of the two output channels is enabled or disabled. To save the settings, press the button again.
GAIN LINK: ON. The CHA/CHB volumes are coupled and can be controlled by turning only one encoder.
GAIN LINK: OFF. The CHA/CHB volumes operate independently.

• *Noise Gate Setup*

Press and hold the CHB button until the LCD display shows:

NOISE LINK SET UP *ON*

Turn the CHB encoder to engage or disengage the noise gate. Then press the CHB button again to save the settings.
ON: Engages a noise gate on CHA and CHB
OFF: Disengages the noise gate

Note: ***Program number 21, without PEQ, CROSSOVER or DELAY, cannot be overwritten in online mode. The other 20 programs can be saved and recalled in online mode.***

7.6 Online mode

• *System requirements*

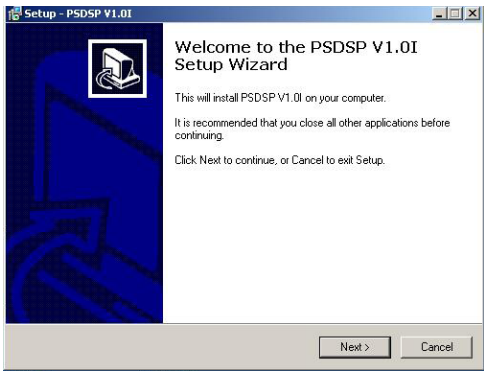
Minimum hardware system requirements for an acceptable performance is a Pentium 450 MHz processor with 128 MB RAM. The *PSDSP software* is designed for 32-bit Microsoft Windows (*NT, 98, ME, 2000, XP, Vista* and *Win7*) operating systems.

• *Software installation*

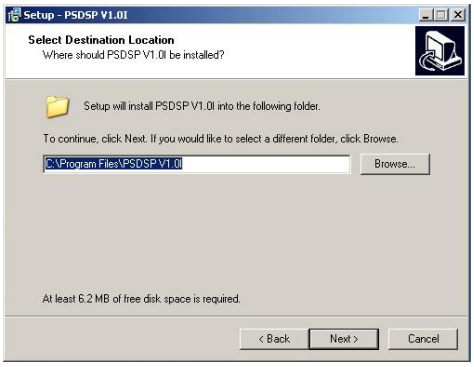
To install the PSDSP software (*version V1.0I* or subsequent), double click the icon below:

Figure 8. Installation icon

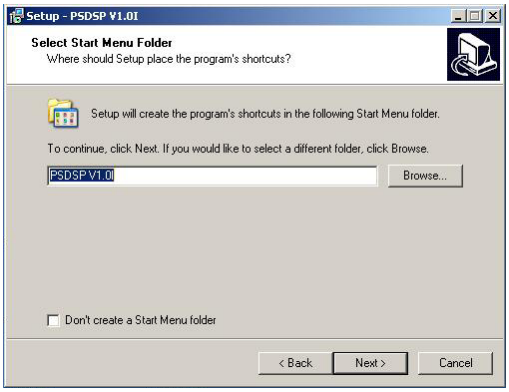
The program installation windows will then appear as follows.



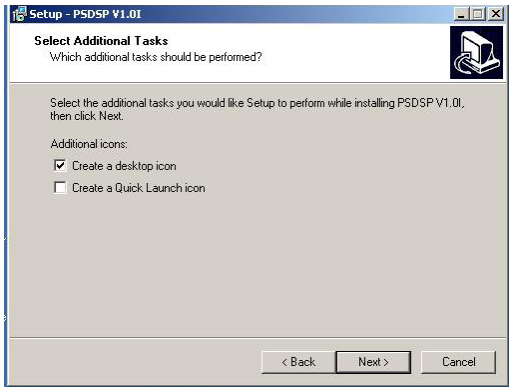
Click *Next>* to continue with the installation.



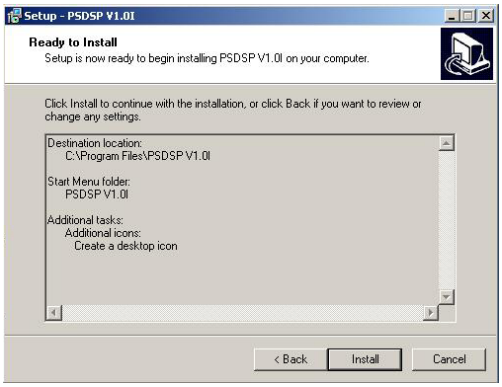
Select a folder where the application will be installed.



Select a folder where the connection to access the software will be installed.



Option to create a desktop link.



Click *Install* to start the installation.

Installation is complete.

- ***Connection to the PC***

Connect the amplifier to the PC using the cable and equipment supplied.

Figure 9. PC cable and adapter supplied by Peecker Sound.

Connect one end of the cable to the PC serial port and the other end to the PC REMOTE socket on the front panel of the amplifier.
Using an RS232 serial cable, connect to the adapter as shown in the image below.

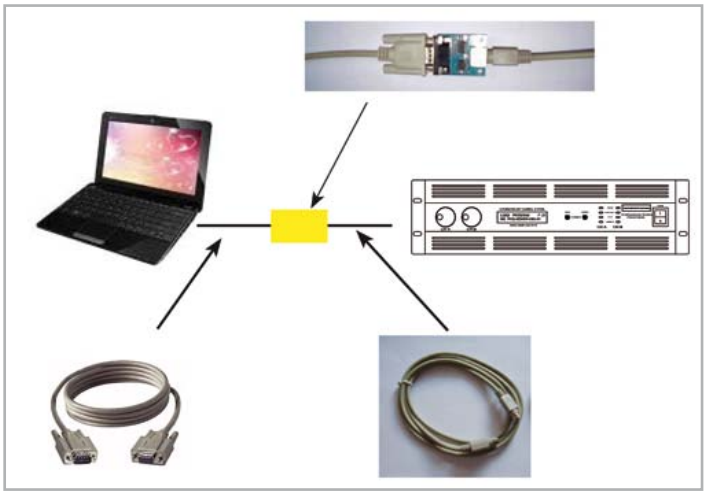
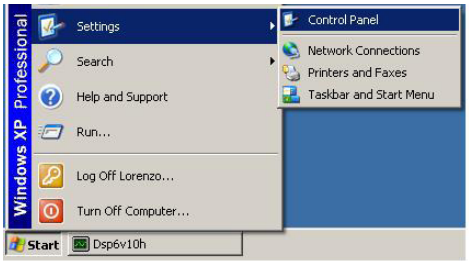


Figure 10. Connection to the PC via RS232

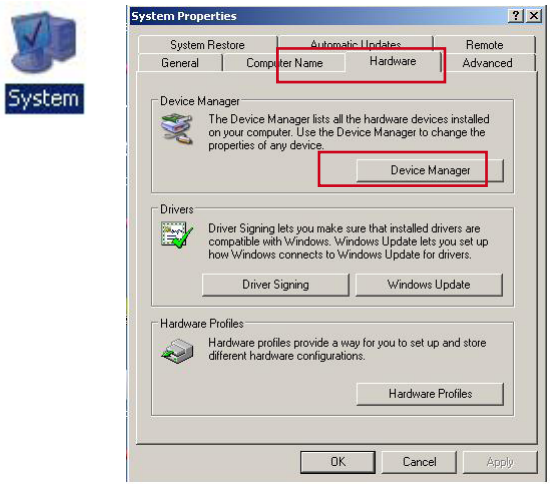
If the PC does not have a serial port, use a USB serial adapter like the one shown below.

Figure 11. USB - RS232 adapter

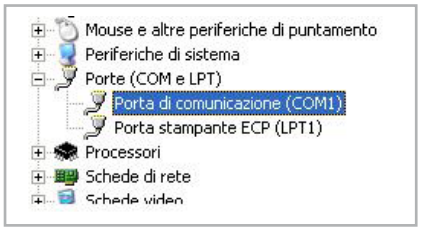
In this case, note that before proceeding with the connection, the adapter should be properly installed and the serial port (a "virtual" COM) should be detected by the operating system.
To make sure that this is the case, go to the *Control Panel*:



Open System Properties and click *Hardware>Device Manager*.

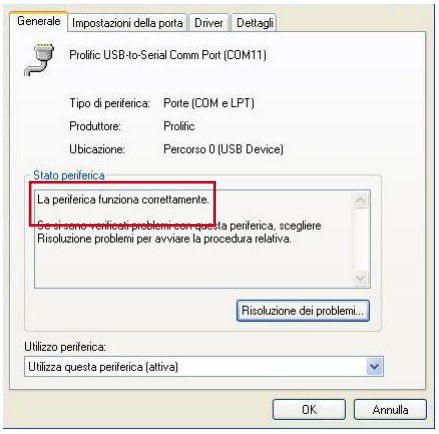


Check that the communication port COMx appears and is working correctly.



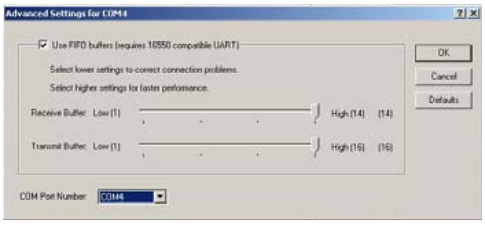
Right click the instructions related to the communication ports to access the properties of the device.

Check that the peripheral connection works correctly.



It is very important to check the port settings. In particular, check the number of the default port (e.g. COM4) by clicking Advanced.

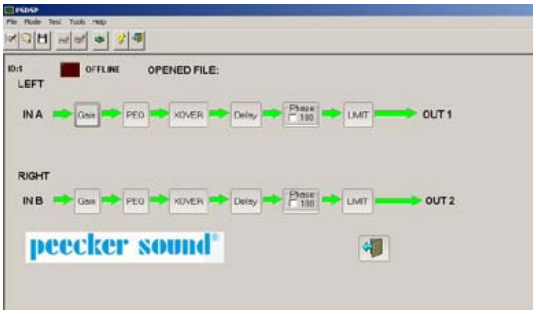
Make a note of the port number, as this will be crucial for a correct amplifier-to-PC connection.



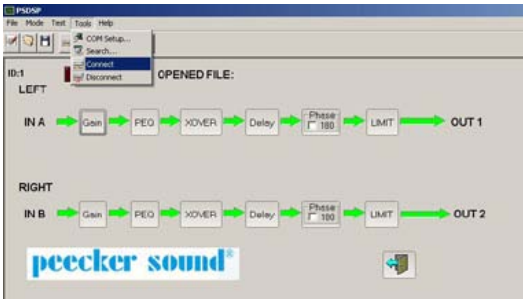
Remember that several PSDSP amplifiers can be connected in cascade configuration using the same number of cables and input/output ports as the number of amplifiers. Groups of amplifiers can be created using the same ID for each amplifier so that some of the settings can be changed simultaneously across the whole group while changing just one interface, the only available one.

• PSDSP software interface

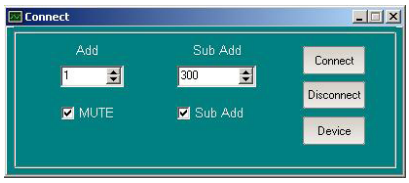
At this point, the *PSDSP software interface* can be accessed so as to make the operational connection between the PC and the amplifier. Double click with the left mouse button on the PSDSP software icon on the desktop so that the screen below appears.



The software-PC connection is made by clicking the *Tools* drop-down menu (at the top of the software) and then on *Connect* (for faster access, click the 'quick link' icon immediately below).



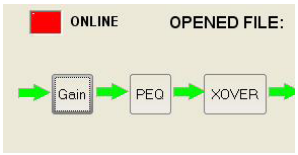
In the *Add* box, enter the ID of the group of amplifiers or single amplifier you wish to control. If you wish to control an individual amplifier out of a group, you need to enter the correct sub address value in *Sub Add* and activate by clicking the respective box underneath, as shown below.
The sub address value is the manufacturer's number associated with an individual amplifier which identifies it uniquely. To find out an amplifier's sub address, press and hold the left-hand encoder until the screen page named "Sub Address: (e.g. 300)" appears.
Activation of the *Mute* option will apply the mute function on making the connection.



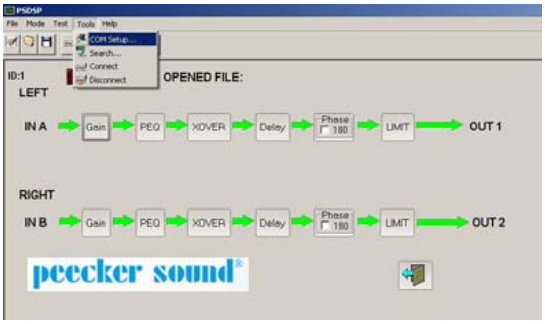
Click *Connect*.
If the addresses entered are correct, the connection has been successful and the system can now be managed via the PSDSP software. Confirmation of successful connection is indicated by the appearance of the LCD display below:

CONNECT SUCCESFUL
PC_CONTROLDEVICE

and the following red light signal (ONLINE) at the top of the software interface:



Should this not be the case, we recommend you check and repeat the above steps again and, if necessary, start the PSDSP software again. Make sure that the COM port number of the PC matches the one set up in the PSDSP program. To do this, open the *Tools* drop-down menu and select *COM Setup*.



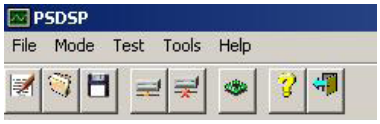
This opens the port selection window. Select the same port as the one previously stored (see the previous steps for installation of PC COM port).

Once the necessary configurations have been set up, disconnect by clicking *Tools->Disconnect*, or via the nearby quick link.
The box below will appear on the amplifier LCD display:

CONNECT CANCEL
MCU_CONTROLDEVICE

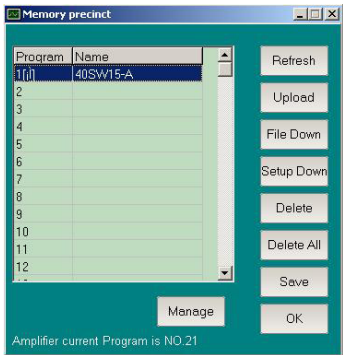
and the (OFFLINE) indicator at the top of the software interface will turn off.

• ***Command menu***



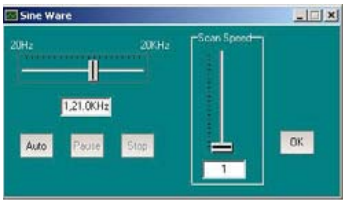
A) File menu
New: creates a new file
Open: opens an existing file
Save: saves the current settings in a file

Memory: opens the PSDSP Memory precinct management used to manage the programs saved in the memory

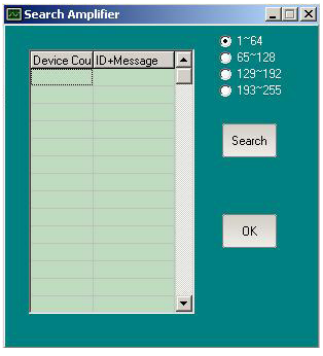


B) Mode menu
Stereo: stereo mode, the input and output of the right and left channels are independent;
Mono: mono mode, the output phase of the left and right channels is the same.

C) Test menu
Sine wave: sine wave generator
Noise: white noise generator



D) Tools menu
COM Setup: selects the COM port.
Search: searches the devices connected to the network.
Connect: connects the amplifiers to the PC.
Disconnect: disconnects the amplifiers from the PC.



E) Help menu
Content: provides the list of topics available in the Help menu.
About: displays the current version of the application.

• Parameter settings

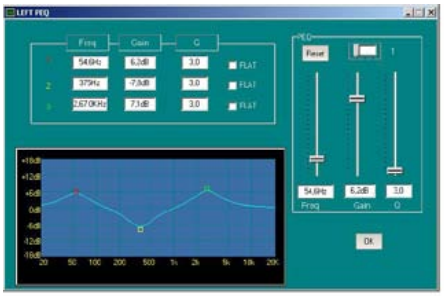
Click on the respective button to adjust the *Gain, PEQ, Crossover, Delay, Phase* and *Limiter* parameters.

Gain

Click *Gain* to set the level of the right/left channel.
Volume: -60 dB up to 6 dB

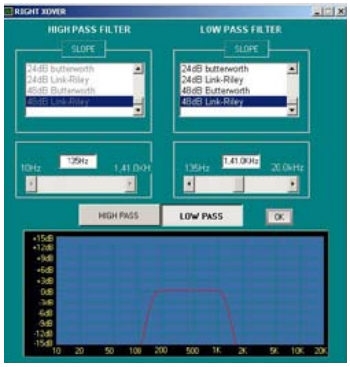
PEQ

Click *PEQ* to adjust the frequency, gain and Q value of the three equalization bands.
Frequency range:
19.7 Hz - 20.2 kHz
Q value: 0.4 - 128
Gain: -12dB - 12dB



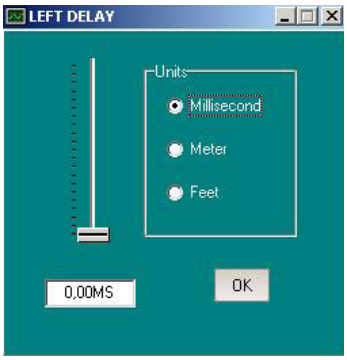
Crossover

Click *Crossover* and then the filter parameters (HPF/LPF slope and frequency) to make the desired setting. The minimum LPF frequency must not be lower than the maximum HPF frequency.



Delay

Click *Delay*. Max delay: 7 ms

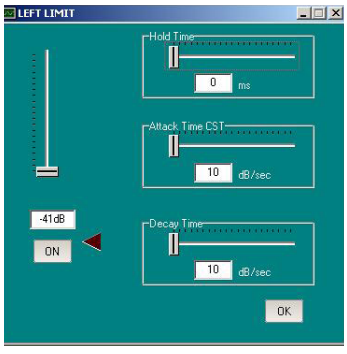


Phase

To select the phase: 0° or 180°

Limiter

Click on *Limiter* to set the Threshold, Hold time, Attack time and Release time



8. PROTECTION SYSTEM FEATURES

All Peecker Sound **PSDSP series** amplifiers are equipped with powerful systems to protect the amplifier and its load. Protection systems are designed to ensure that power amplifiers have a long operating life.

8.1 Limiter

When the CLIP LED lights up, the limiter is active. In this case the channel gain will be reduced automatically to protect the load (acoustic speakers) from damage caused by a distorted signal. The limiter circuit cannot be disengaged.

8.2 Thermal protection

The temperature level of the heat sink is constantly monitored, as indicated by the TEMP LED. When the heat sink temperature goes above 60° C the cooling fan switches on, while at 90° C (anomalous operating condition) the TEMP LED lights up and the whole system goes into *mute mode* until the temperature returns to normal levels.

8.3 Load safety control

The state of the output signal in PSDSP series amplifiers is constantly monitored. Should the power load exceed the maximum allowable level, the output voltage will be automatically readjusted so that the amplifier can operate safely. Should the connected load impedance be significantly below recommended levels, the amplifier's output phase will be inhibited.

8.4 Protection from DC voltage

The presence of a DC voltage is monitored on both channels independently. If a value equal to or above *7 Volts* is detected, the amplifier's output stage will be inhibited. This protects the speakers against DC voltage.

8.5 Power on/off transients

To eliminate power on/off transients, which can damage loudspeaker systems, a *soft start* circuit is enabled that connects the load with delay and disconnects it immediately.

9. TESTING PROCEDURE FOR ELECTRO-MECHANICAL OPERATION

The testing protocols for the various series of amplifiers manufactured by Sound Corporation (XTDT series by X-Treme and **PSDSP** and PS series by **Peecker Sound**) have been designed according to the ***FMEA*** (***Failure Mode and Effect Analysis***) method. This is a risk assessment system deriving from electro-mechanical reliability studies used widely in industrial and non-industrial sectors to evaluate the reliability of both products and processes. FMEA consists of procedures for analysing potential failures; they are repeatable, transparent and guarantee total control of the manufactured product operating functions and absolute reliability. FMEA results basically consist of the following two documents:

- The first is an internal Sound Corporation tool designed for the Product Development Department with an indication of the various critical areas detected and suggested actions for improvement, such as increasing *MTTF* (*Mean Time to Failure*) and/or the life cycle of the amplifier under investigation.
- The second arises from detailed knowledge of failure modes and is used to determine precisely the amplifier's correct operating conditions as well as the corresponding checking operations. This procedure is also available to the final customer in the form of this checking procedure.

Please note: Before removing any module or connector, remember to disconnect the amplifier from the mains and take care when handling power supply capacitors as they might be under load. To prevent short-circuits during testing, the oscilloscope must be earth insulated. Do not test the amplifier while the speakers or cones are output connected, use the appropriate dummy loads only. When increasing the output voltage of the variable voltage transformer (*VariAC*), never exceed the amplifier's nominal output value plus its tolerance, since higher voltage levels might seriously damage the amplifier.

9.1 Required equipment

List of testing equipment:
- Digital multimeter
- AC millivoltmeter
- Dual trace oscilloscope
- Audio signal generator
- 15A-250V Variac
- Two 4 Ω (1800W) dummy loads
- Two 8 Ω (1100W) dummy loads
- *Audio Precision* (AP) analyser
- Vibrating table for mechanical testing
- Withstanding voltage tester

9.2 Visual check

Check that the product is correctly assembled and verify whether there are any incorrectly mounted or damaged parts, open connections or short circuits.

9.3 Electrical testing procedures

1. Use the *withstanding voltage tester* to test the amplifier: turn off the amplifier, set the voltage testing level at 1500V and the test time at 60 seconds. If the leakage current does not go above 5mA the test has been successful.
2. Check the whole unit thoroughly for any *short circuits* using the multimeter. Verify that the voltage supply and earthing are correct and that the power supply cable is undamaged. After the amplifier has been turned on once, make sure there are no short circuits.
3. Using the *VariAC*, set the *power supply* in the primary coil of the transformer at *230 V*. This voltage value has to be monitored and adjusted in order to be kept constant throughout duration of the test. Turn the amplifier on and off six times to check whether the power switch works correctly, the relays are activated (with a certain amount of delay), and both protection LEDs are flashing.
4. Check that the voltages in the power supply module are as follows:
   A) *AC voltage* values in the secondary coil should be:
   56 V---0---56 V (PSDSP3400)
   50 V---0---50 V (PSDSP2600)
   45 V---0---45 V (PSDSP2000)
   All models must have the following *AC output voltage* values:
   19 V---0---19 V, 17 V---0---17 V, 0---10 V
   B) *DC voltage* on the amplifier modules should be:
   ±78 V (PSDSP3400)
   ±68 V (PSDSP2600)
   ±61 V (PSDSP2000)
   (Tolerance: ±1 V).
   C) *Protection circuits power supply voltage*: ±24 V (Tolerance: ±2 V).
   D) *Fans power supply voltage*: –24 V (Tolerance: ±2 V).
   E) *Power supply voltage* in the *pre-amplifier module*: ±12 V
   (Tolerance: ≤ ±0.5 V).
   F) *Power supply voltage* in the digital controller: +15 V /-15 V and +5 V
   (Tolerance: ≤ ±0.1 V).
5. Check that the *background noise* in both channels is below 1m (-58 dBu) and that there is no signal after switching off the unit. Use the oscilloscope to perform this test, connecting a speaker for a sound check if necessary.
6. Measure the *voltage on the collector* of Q104, Q103, Q204 and Q203 and check that it is ±1.2V. If necessary, adjust the 1 kΩ trimmer so that this value has a tolerance less than or equal to ±0.1 V (≤ ±0.1V). The output terminal DC voltage must be less than or equal to 10 mV (≤ ±10 mV).
7. *Dynamic testing*:
   - Set a sinusoidal signal at 1 kHz (set the signal level at a value close to clip LEDs activating signal).
   - Connect a 4 Ω load (of suitable power) in one channel only. The output signal voltage should be:
     63 V (PSDSP2000),
     72 V (PSDSP2600),
     82 V (PSDSP3400).
   - Check that the output waveform is regular. Shake the input/output connectors to check that they are reliable and there are no faulty contacts.
8. *Signal LED test*: check that the LED lights up when there is an input signal (set the Gain of each channel at maximum level).
9. Make sure that the *crosstalk* is greater than or equal to 50 dB (≤ 50 dB).
10. Check that the *CMRR* (@ 1kHz) is greater than or equal to 60 dB (≤ 60 dB).
11. Check the *phase* between output and input.
12. Connect the 8Ω loads on both channels, set the volume to maximum level and check that there is no *background noise* due to the power supply transformer.
13. Test the *frequency response*: 20 Hz÷20 kHz ±0.5 dB.
14. Bring the heat sink temperature to 50° C and check that the *fans* are operating (and noiseless).
15. Check that, at maximum output power, the *current* is:
   - with a 8Ω load: 9 A (PSDSP2000), 10 A (PSDP2600), 11 A (PSDSP3400)
   - with a 4Ω load: 15 A (PSDSP2000), 18 A (PSDSP2600), 20.5 A (PSDSP3400)
16. *Output protection test*: short-circuit the output with 2Ω and check that the protection system activates (the relays should disconnect the load).
17. Adjust the *mains power supply voltage* (using the Variac) from 205 V to 255 V and check that the amplifier is operating correctly.
18. Check that the *THD* (@ 1kHz) is less than or equal to 0.08% with an 8Ω load.
19. Test for *vibrations* and correct amplifier operation using the vibrating table for mechanical tests.
   - Vibration frequency: 5-60 Hz
   - Direction: vertical, horizontal
   - Test duration: 180 seconds
   - Check that there is no output signal after the vibration test has been performed
20. *Burn-in test*
   - Using a Pink Noise generator, set the input signal so as to obtain 1/8 of nominal output power @ 4 Ω.
   - Check that the clip LEDs light up occasionally though not too repeatedly.
   - After 4 hours of testing, check general operating functions.

10. BLOCK DIAGRAM OF PSDSP AMPLIFIERS

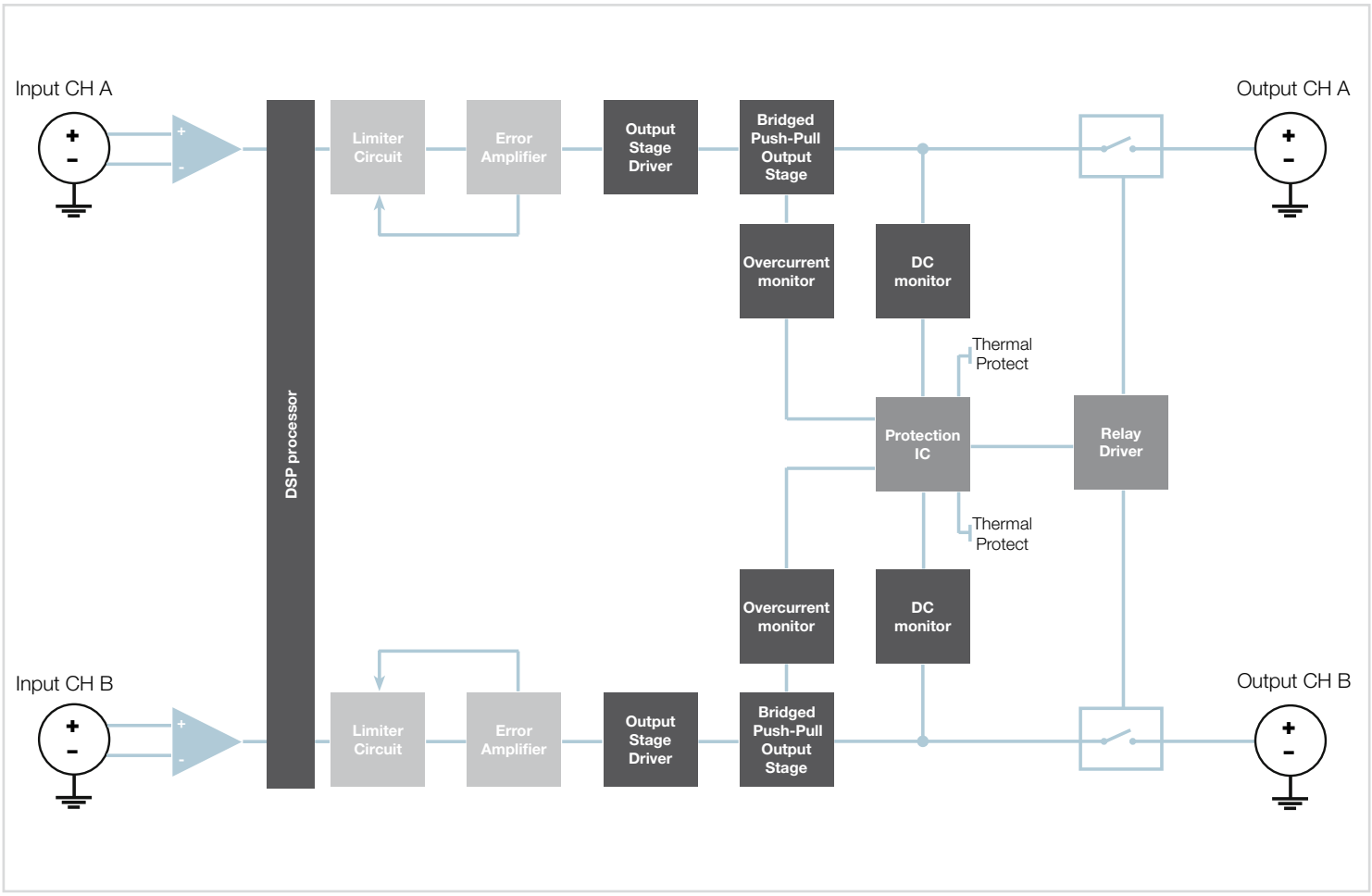


Figure 12. Layout of the main functions of PSDSP amplifiers

11. TECHNICAL SPECIFICATIONS

MODEL	PSDSP2000	PSDSP2600	PSDSP3400
Power Output (per channel)			
8 Ω	**650 W***	**850 W***	**1000 W***
4 Ω	**1000 W***	**1300 W***	**1700 W***
*EIA 1 kHz - 1% THD, both ch.s driven @230 VAC			
Net Weight	32 kg	32 kg	33 kg
Frequency Response	20 Hz ÷ 20 kHz (± 0.5 dB)		
SNR	> 90 dB		
Distortion (THD+N)	< 0.1% (@ 1 kHz)		
Input Gain Controls (per channel)	-∞ ÷ +6 dB		
Input Impedance	30 kΩ, electronically balanced		
Input Sensitivity	0 dBu		
Crosstalk	> 50 dB		
Phase Response	-18° @ 20 Hz, +25° @ 20 kHz		
Damping Factor	> 200 (@ 8 Ω, 1 kHz)		
Input Connectors (per channel)	3-pin Neutrik® XLR		
Output Connectors (per channel)	Neutrik® speakON, screw terminals		
Controls	Front: power switch, ChA/ChB digital encoders. Rear: ground lift		
Led Indicators	Temperature, Protect, Clip, Signal		
Display	2×20 LCD backlit		
DSP Word Code	24 bit		
DSP Sampling Rate	48 kHz		
Dynamic Range	up to 116 dB		
Amplifier Protections	overload, full short circuit, thermal, ultrasonic and radio frequency immunity		
Load Protections	soft start, soft clip limiter, DC-fault		
Circuitry	class AB		
Cooling	front to rear air flow, fan speed in function of temperature per channel		
Power Requirements	230 VAC (± 10%) , 50/60 Hz		
Dimensions (W×H×D)	483 (19") × 132 (3RU) × 488 mm		
Approvals	CE EN55103-1 (*Emissions*), CE EN55103-2 (*Immunity*), CE EN6065, Class I (*Safety*)		