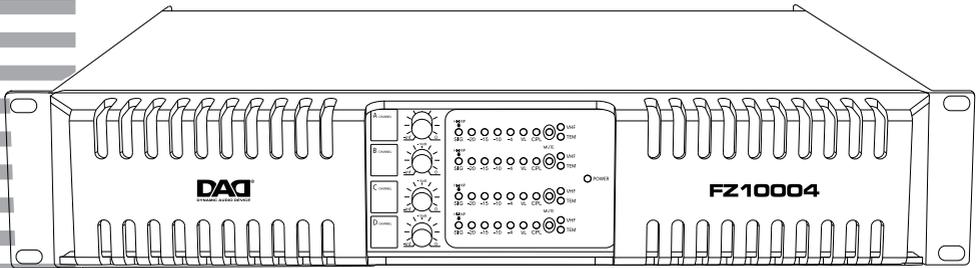


# FZ10004

SWITCHING POWER AMPLIFIER



USER MANUAL

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### Warranty

---

#### Packing content

- FZ10004
  - Power cord
  - User manual
-



**WARNING!** Before carrying out any operations with the unit, carefully read this instruction manual and keep it with care for future reference. It contains important information about the installation, usage and maintenance of the unit.



## SAFETY

### General instruction

- The products referred to in this manual conform to the European Community Directives and are therefore marked with **CE**.
- The unit is supplied with hazardous network voltage (230V~). Leave servicing to skilled personnel only. Never make any modifications on the unit not described in this instruction manual, otherwise you will risk an electric shock.
- Connection must be made to a power supply system fitted with efficient earthing (Class I appliance according to standard EN 60598-1). It is, moreover, recommended to protect the supply lines of the units from indirect contact and/or shorting to earth by using appropriately sized residual current devices.
- The connection to the main network of electric distribution must be carried out by a qualified electrical installer. Check that the main frequency and voltage correspond to those for which the unit is designed as given on the electrical data label.
- This unit is not for home use, only professional applications.
- Never use the fixture under the following conditions:
  - in places subject to vibrations or bumps;
  - in places with a temperature of over 45 °C.
- Make certain that no inflammable liquids, water or metal objects enter the fixture.
- Do not dismantle or modify the fixture.
- All work must always be carried out by qualified technical personnel. Contact the nearest sales point for an inspection or contact the manufacturer directly.
- If the unit is to be put out of operation definitively, take it to a local recycling plant for a disposal which is not harmful to the environment. 

### Warnings and installation precautions

- This product in combination with loudspeakers, may be capable of producing dangerous sound levels that could cause permanent hearing loss. Do not operate for a long period of time at high volume level or at a level that is uncomfortable.
- Do not install the fixture near sources of heat.
- If this device will be operated in any way different to the one described in this manual, it may suffer damages and the guarantee becomes void. Furthermore, any other operation may lead to dangers like short circuit, burns, electric shock, ect.
- The fixture must be located in a place where a proper ventilation or thermal dissipation is not impeded. Do not install the fixture in a confined space.
- After connecting to the power supply, standby LED lights up to show that some components inside have already been electrified.
- Linking an output to an oscilloscope - when in "bridge" mode - is forbidden or it will cause damage to the amplifier and to the equipment.
- The output level of the amplifier must never exceed the marked sensitivity.
- Do not link the output of any amplifier channel back into another channel's input. Do not parallel or series connect an amplifier's output with any other amplifier's output.
- In system's setup, amplifier's output power must be from 50% up to 100% greater than the loudspeaker's rated power.

- Make sure that the signal is correctly connected to the amplifier's input channel and set to the proper input mode.
- Please turn off the power switch before pulling off the power cord.
- At the beginning, please always set the volume at the -80dB position.
- Before starting any maintenance work or cleaning the unit, cut off power from the main supply.
- Please clean the dust filter placed on front panel.

## **GENERAL INFORMATION**

### **Shipments and claims**

The goods are sold "ex works" and always travel at the risk and danger of the distributor. Eventual damage will have to be claimed to the freight forwarder. Any claim for broken packs will have to be forwarded within 8 days from the reception of the goods.

### **Warranty and returns**

The guarantee covers the fixture in compliance with existing regulations. You can find the full version of the "General Guarantee Conditions" on our web site [www.musiclights.it](http://www.musiclights.it). Please remember to register the piece of equipment soon after you purchase it, logging on [www.musiclights.it](http://www.musiclights.it). The product can be also registered filling in and sending the form available on your guarantee certificate. For all purposes, the validity of the guarantee is endorsed solely on presentation of the guarantee certificate. Music & Lights will verify the validity of the claim through examination of the defect in relation to proper use and the actual validity of the guarantee. Music & Lights will eventually provide replacement or repair of the products declining, however, any obligation of compensation for direct or indirect damage resulting from faultiness.

## - 1 - INTRODUCTION

### 1.1 DESCRIPTION AND TECHNICAL SPECIFICATIONS

FZ10004 is a 4ch amplifier capable to deliver 4x2500W @20hm and 4x2100W @40hm, in 2U rack mount only.

These features make it ideal for professional full-range speakers and in multi-amplified system characterized by wide dynamics and high performance.

- The FZ amplifiers series uses the technology of amplification in Class I with SMPS power stage.
- The operation in Class I is based on a continuous and automatic adjustment of the value of the supply voltage of the final stage. This optimizes the efficiency up to 85%, reducing the weight and heat dissipation comparing with other amplifiers which deliver same output.
- The models of FZ serie are able to operate with loads from 20hm and are equipped with an extensive set of protection circuits to satisfy the higher reliability parameters with high quality profile for fixed and mobile sonorizations.

### 1.2 MAIN FEATURES

The amplifier incorporates a number of sophisticated technologies to ensure the best possible performance and many years of reliable operation. Familiarizing yourself with these technologies will prove invaluable in setting up and optimizing your loudspeaker system.

#### **Class I amplifier Continuos and Automatic Adjustment Power Supply**

Class I technology combines the exceptional efficiency of a Class D amplifier with the high sonic quality associated with Class B designs. Class I also incorporates the same basic concepts behind Class H designs, but here they are refined and pushed to a higher level to achieve greater efficiency.

The Class I output sections work in concert Continuos and Automatic Adjustment Power Supply to create a superior overall power amplifier topology. Ensures stable, full output power over an extremely wide range of mains voltage levels. Sagging or fluctuating mains voltage will not affect the power output delivered to the loudspeakers.

#### **Amplifier gain**

For greater flexibility in system Integration, amplifier allow gain adjustment from +23dB to +44 dB in 3dB steps. This feature accommodates any combination of input device and loudspeaker type.

For example, if the input signal is weak, the gain can be boosted to maintain maximum power output while avoiding a poor signal-to-noise ratio. This gain adjustment feature makes it easier to achieve an optimal balance between headroom and noise floor.

#### **Voltage Limiter (VL)**

The Voltage Limiter (VL) feature allows user adjustments that determine maximum voltage output, thus matching the amplifier to the connected speaker load. Regardless of load impedance, the VL feature can be set to ensure that neither temperature nor current limitations are exceeded before reaching the desired voltage threshold.

#### **Protection and performance optimization**

Appropriate and reliable power amplification is vital to any audio system. Inadequate or faulty power amplification could cause damage to the loudspeakers or in some cases to the power amplifiers themselves. To prevent any damage or costly service interruptions, the amplifier offer advanced features to protect both internal circuits and any connected loads. These features even protect the mains fuse that, in extreme cases, could be overloaded. Following are short descriptions of standard built-in protection features:

- CPL , (Current Peak Limiter) ensures that the amplifier's Output does not exceed the safe current handling parameters of amplifier components.
- Temperature protection ensures that the amplifier will not be damaged by exceeding thermal limits.
- VHF , (Very High Frequency) protection circuits mute the output of the amplifier when non dynamic continuous signals above 10 KHz are detected.
- DC protection ensures destructive DC signals will not appear at the amplifier outputs. If such conditions occur an internal fuse opens and fault indication is displayed.
- Low-impedance (short circuit) protection provides a fault warning indication and shuts down the output stage when, for example, an input signal is present and a malfunctioning cable or driver is short circuiting the output.
- High-impedance warning reports an alert when, at the same time, output signal is high and no current draw is measured. This situation might occur when no speakers are connected, or when a driver is blown.
- Low inrush current ensures that the mains breaker will not trip when several power amplifiers are turned on simultaneously.

### **Patent AMP Module hot plug in/out technology**

Plug in or out directly, so there is no need to switch the power off or turn down signal of the device during the operation of AMP module.

### **2Ω Heavy duty non-heat protection**

In the condition of 2 heavy duty, the power module will decrease power automatically before thermal protection to make amplifier outputs normally with without mute. The power module will increase automatically to the preset value after over-heat disappeared.

### 1.3 FRONT-PANEL OVERVIEW

The amplifier's front panel presents the performance and fault condition indicators, power and remote switches, and a removable dust-filter cover. Level potentiometers provide individual attenuation for the amplifier channels. Range is 0dB to - infinity. (The 12 o'clock position indicates -10dB attenuation.) A convenient label strip with writing surface is provided adjacent to each level potentiometer.

To remove the dust-filter covers, loosen the thumbscrews located underneath the front handles. This allows removal of the dust-filters for cleaning. The covers may be made tamper resistant by replacing the thumbscrews with Philips head or safety Torx screw. Thread size is M3.

The amplifier never should be operated without the dust-filters in place.

#### Front

The front-panel LED area includes the following indicators per channel:

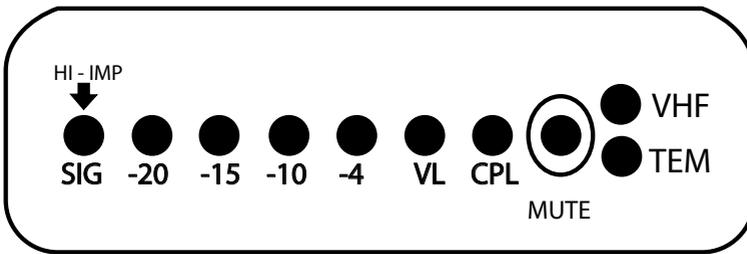


Fig.1 - Front-panel LED area

- VHF - Very High Frequency protection active (output muted) (Red constant)
- TEM - Temperature mute (Red constant)
- MUTE - Channel muted due to a fault condition (yellow)
- CPL - (yellow constant with output muted): Low impedance / short circuit detection fault
- VL - Voltage Limiter (VL) active
- SIG - Signal levels - 40dB (Sig) to -4dB
- HI-IMP - High-impedance/open load detected (Red)

When no VL, CPL or PAL indicators are illuminated, and the VL DIP-switch is set to maximum at the specified nominal load, the amplifier channel is able to deliver maximum rated output power.

Its normal light has been shown "BLUE" during power on.

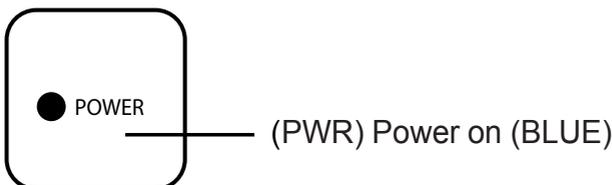
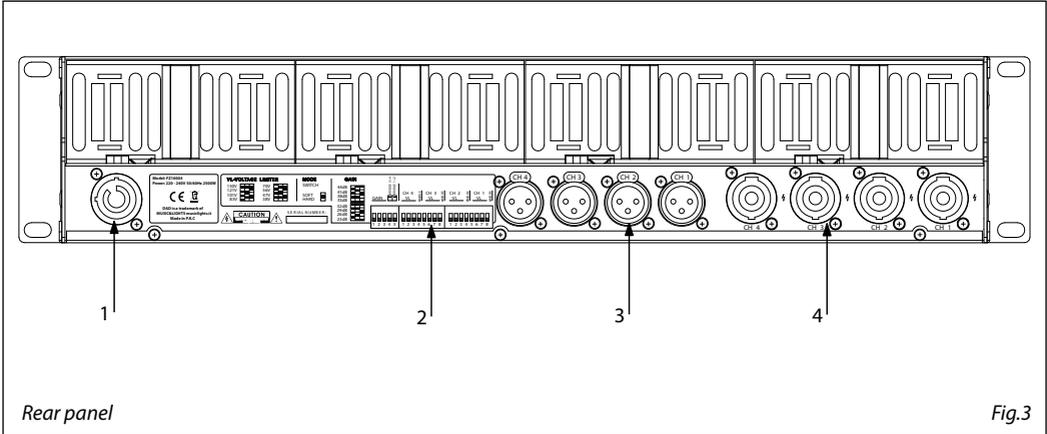


Fig.2 - Power LED

## 1.4 REAR-PANEL OVERVIEW

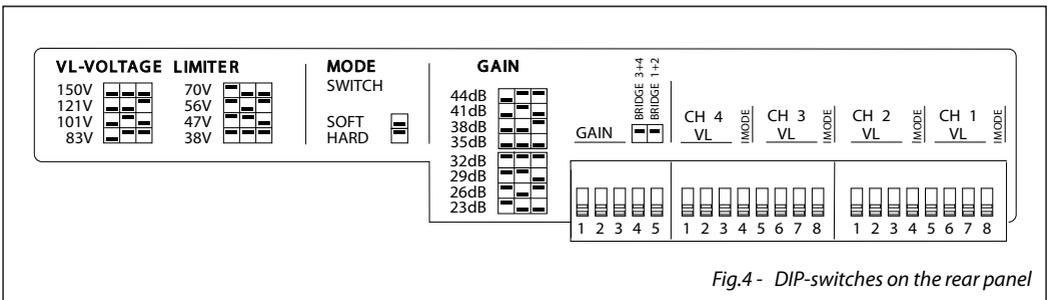


1. MAINS INPUT 110V OR 220V OPERATION (NOT SELECTABLE).
2. DIP-SWITCHES FOR ADJUSTING KEY FEATURES.
3. XLR INPUT CONNECTORS
4. 4 CHANNEL VERSION SHOWN WITH NEUTRIK SPEAKON OUTPUT CONNECTORS.

### Configuration section

Four-channel model shown. The amplifier has different VL values. Functions are otherwise identical.

### DIP-switch features



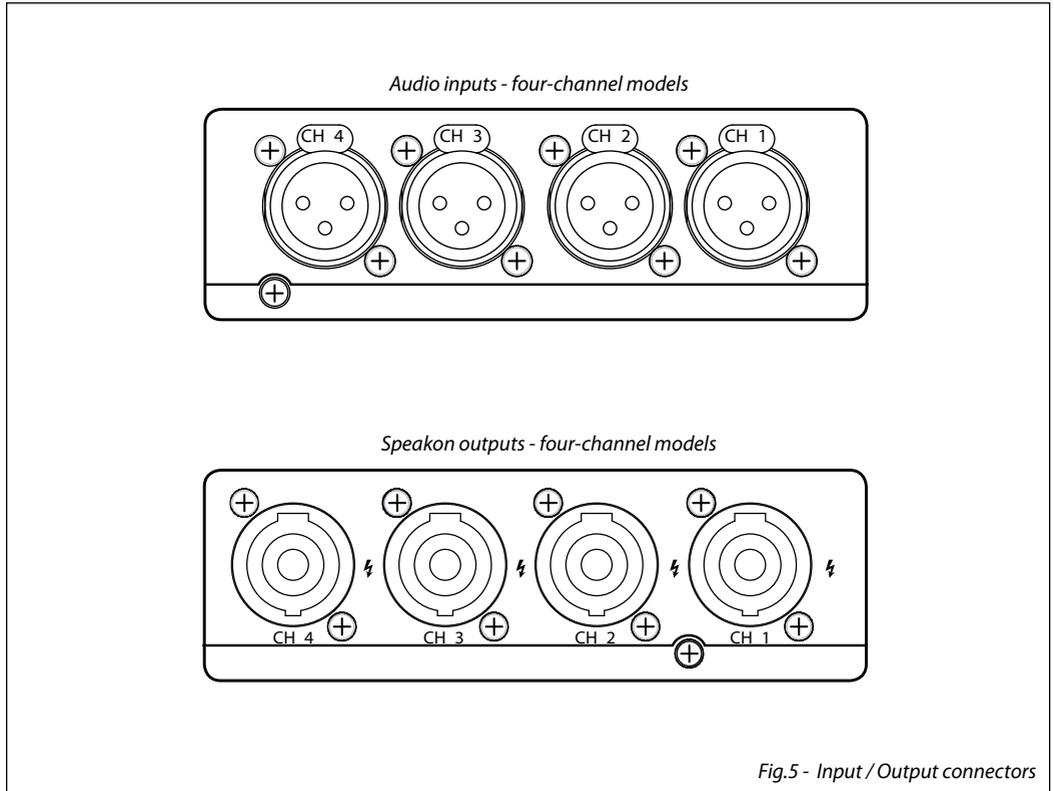
The following features may be adjusted using the DIP-switches on the rear panel of the amplifier.

- Gain - Globally set for all channels, from +23dB to +44 dB in 3dB steps.
- Option active - Not currently implemented.
- Fan Masked - When on, engages the intelligent fan feature; fan speed is lowered when no signal is present.
- Bridge A+B and C+D - Switches the channel pairs into bridge mode operation An automatic - 6dB gain compensation is applied.
- VL - The Voltage Limiter provides optimum peak voltage settings for each channel . Eight discrete levels are selectable.
- Mode - Select VL mode to either Hard or Soft operation. For channels driving sub-woofers and low-frequency drivers, it is recommended to use the hard setting for optimal operation. For mid- and high-frequency drivers, always select Soft.

VL	VL in Bridge Mode
150V	300V
121V	242V
101V	202V
83V	166V
70V	140V
56V	112V
47V	94V
38V	76V

### Input and Output connectors

The amplifier is equipped with balanced XLR-F input connectors. Speakon output connectors (SP). For specific configuration and wiring information, see section 3.4.



### 1.5 METHOD FOR AMP MODULE HOT PLUG

How to:

Push in: - Stir the plug in/out bar to the handle (right side), and then push into the bottom of slot directly. It's only can be used after an indicative sound from the auto-lock switch that means the module is positioned. (It is very important to make sure that the module has been pushed in completely).

Pull out: - When need to pull out the module, stirring the plug in/out bar to the handle (right side), the module will draw out from the position automatically, and then pull out the module easily and simple.

Please insert/pull by one time only due to AMP module featuring high power connection.

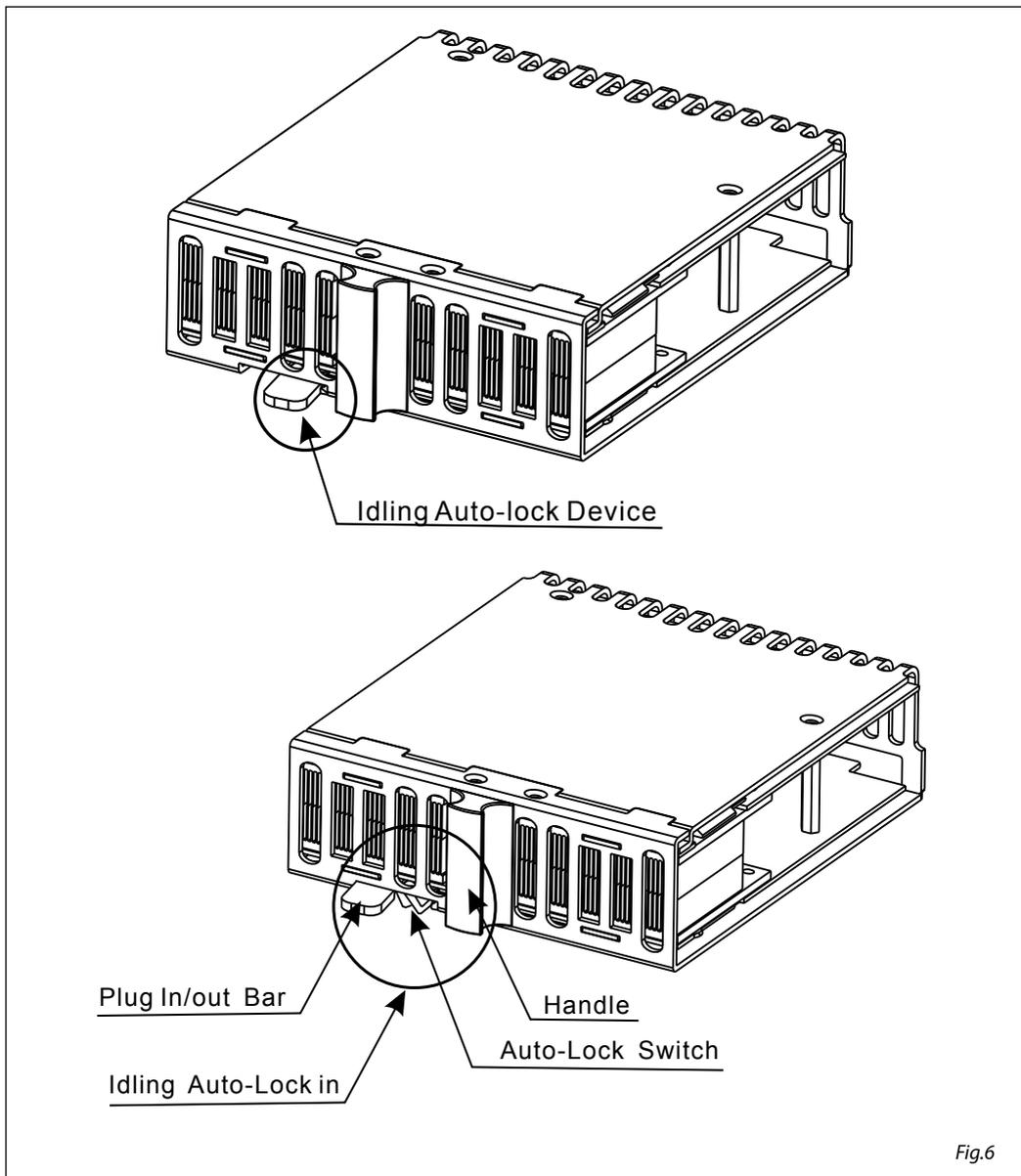


Fig.6

## - 2 - INSTALLATION

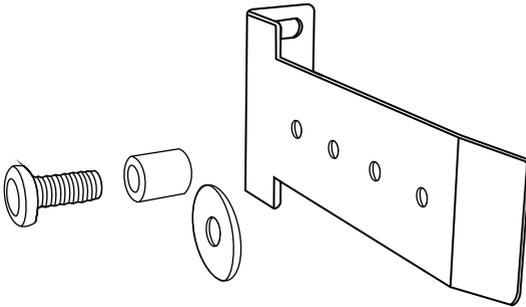
### 2.1 UNPACKING

Carefully open the shipping carton and check for any noticeable damage. The power amplifier is tested and inspected before leaving the factory and should arrive in perfect condition. If any damage is discovered, please notify the shipping company immediately. Only the consignee may institute a claim with the carrier for damage incurred during shipping. Save the carton and packing materials. Inspection. Should you ever need to ship the amplifier, always use the original packaging materials.

### 2.2 MOUNTING

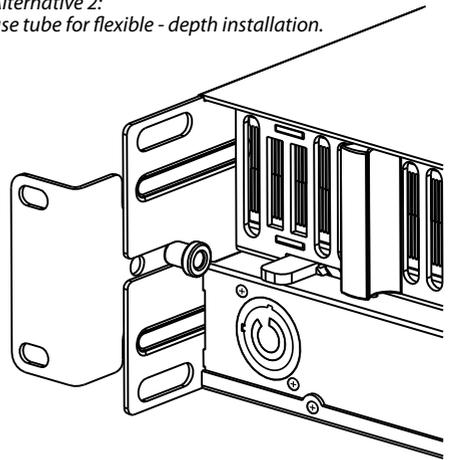
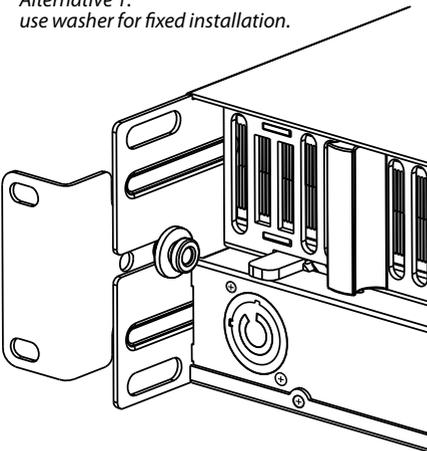
Free airflow from front-to-rear of the amplifier must be possible. Therefore, no doors or rack-lids should be mounted in front of or behind the amplifiers. Amplifiers may be stacked directly on top of each other. There is no need for spacing in between units, though this might enable more convenient installation of cabling on the rear panel. It is recommended that rear supports be mounted for maximum long-term stability. Rear support brackets are included.

*Standard Accessories (package Included)*



*Alternative 1:  
use washer for fixed installation.*

*Alternative 2:  
use tube for flexible - depth installation.*



*Fig.7 - Rear support bracket*

### 2.3 COOLING

The amplifier uses a forced-air cooling system with air flow from front to rear, maintaining a low operating temperature within defined limits. Front-to-rear airflow is preferred as cooler air is present at the front in nearly all applications. (This allows higher continuous power levels without encountering thermal problems). Never attempt to reverse the airflow. The amplifier modules require a pressure chamber between the fans and heat sink, and this effect functions only in one direction.

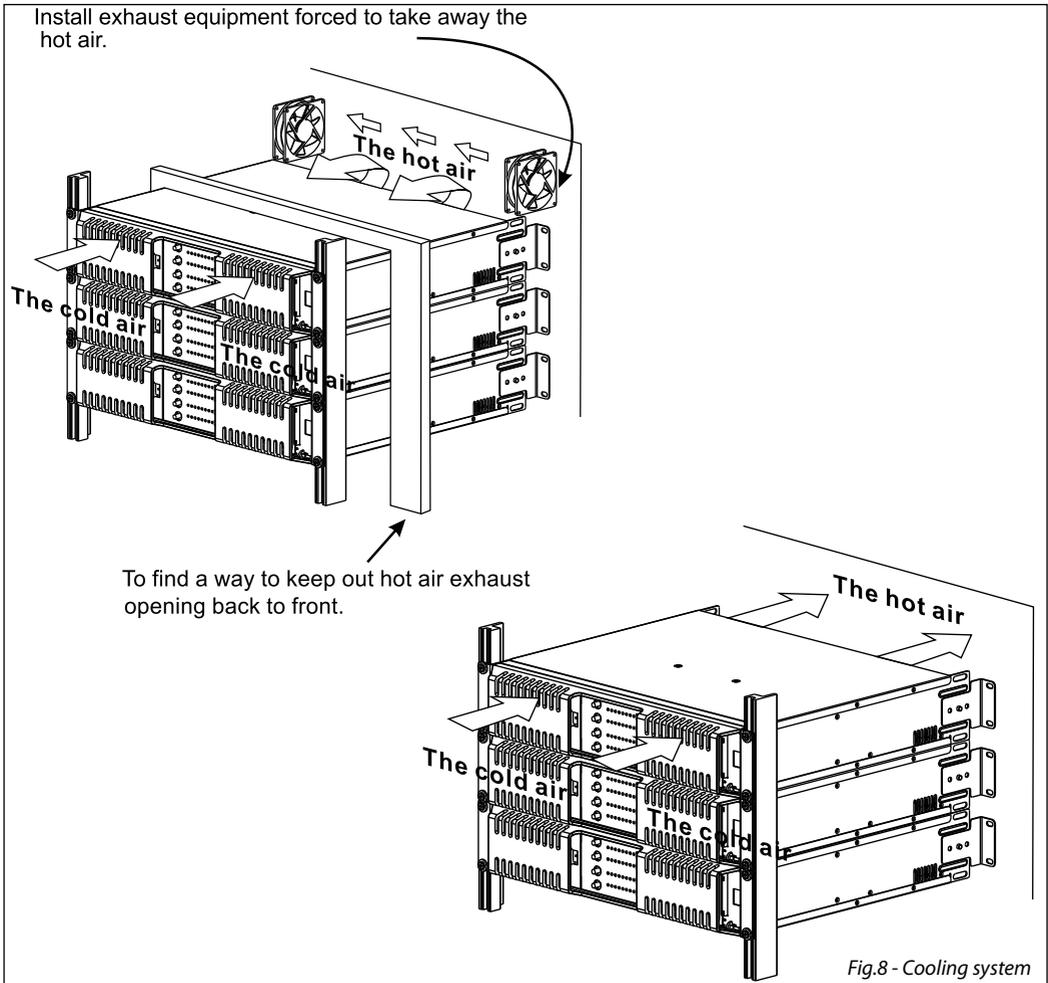
Make sure that there is an adequate air supply in front of the amplifier, and that the rear of the amplifier has sufficient space to allow the exhaust to escape. If the amplifier is rack-mounted, do not use covers or doors on the front or rear of the rack.

Should a heat sink overheat, the temperature sensing circuits will mute the overheating channel.

If the power supply overheats, another sensing circuit will mute all output channels until the power supply cools to safe operating temperature. An early warning before shut down will be indicated on the front panel LEDs.

Always make sure that the dust-filters behind the detachable front panel are clean to ensure maximum possible airflow.

If the amplifier malfunctions due to dirty dust filters, any required repairs are not covered by the warranty.



## 2.4 OPERATING VOLTAGE

The label placed to the right of the mains cable on the rear of the amplifier indicates the AC mains voltage for which the amplifier is wired and approved: 110V or 220V. Connect the power cable only to the AC source type referred to on the label. The warranty will not cover damage caused by connecting to an incorrect type of AC mains.

The switch mode amplifiers use primary switching. Because the mains power is rectified directly in front of the transformer, the amplifier is insensitive to mains frequency. It may be connected to 50 or 60 Hz sources, and actually will operate on line frequencies from DC to 400 Hz.

The amplifier uses POWERCON connection. If the power plug mounted at the factory is not appropriate for your country, it can be removed and the proper connector wired in its place as follows:

Wire Distribution:

WHITE	LIVE
BLACK	NEUTRAL
GREEN	EARTH(GROUND)

If you are not 100% confident of your competence to replace the mains plug, engage qualified personnel to do the job.

Once a suitable AC supply is connected, the amplifier can be turned on using the front panel power switch. The amplifier then goes through a soft-start. The fans will blow at high speed before dropping to idle, and the power LED will illuminate.

Inrush power is controlled and limited during soft start , enabling multiple amplifiers to be powered up simultaneously.

## 2.5 GROUNDING

There is no ground lift switch or terminal on the amplifiers. The signal ground is always floating, via a resistor, to chassis and therefore the grounding system is automatic.

In the interests of safety, never disconnect the earth (ground) pin on the AC power cord.

Use balanced input connections to avoid hum and interference.

## - 3 - FUNCTIONS AND SETTINGS

### 3.1 INTRODUCTION

The following sections provide comprehensive information on amplifier connection, setup, operation, and performance. The detailed information included here is essential to realizing the full functionality of the amplifiers.

### 3.2 OPERATION PRECAUTIONS

- Make sure that the Power switch on the amplifier front panel are set to off before making any input, output, and also before manipulating the DIP-switches on the rear panel.
- Make sure that the AC mains voltage is correct and matches the voltage printed on the rear panel of the amplifier (110V or 220V).
- Make sure that no signal is present at the input to the amplifier when powering up. An input signal could produce an unintentionally loud initial volume from the speakers.

### 3.3 SIGNAL FLOW AND HEAD ROOM

#### Signal flow blocks

The input stage of amplifiers has a high sensitivity to provide ample system headroom. This in effect means that the input stage is almost impossible to clip.

Overall amplifier input gain is adjusted using the input stage DIP-switches. Please note that the gain setting is global, affecting all channels. Following the input stage, the dedicated level control on each channel allows signal attenuation from 0dB to minus infinity.

The Current Peak Limiter (CPL) section dynamically limits the input signal based on three parameters: sensed current level, feedback from the output stage, and sensed voltage clip from the VL (and output amplifier voltage clip if Soft Clip is activated). This ensures that power output is maintained within the design limits of the amplifier.

The adjustable Voltage Peak Limiter (VL) sets the maximum output voltage and therefore also the maximum output power. Eight different voltage stages are available using the DIP-switches on the rear panel of all models.

The sophisticated output section monitors faults and generates appropriate warnings, which are displayed on the amplifier front panel. In the rare event that conditions are extraordinarily severe, the amplifier will shut down until the fault or problem setting has been rectified or adjusted. These sensing circuits are also employed to feed back voltage and current level information, via a side chain, to the limiters. Sensing circuits also transmit local amplifier module temperature and power supply temperature to the appropriate protection mechanisms. Read the Protection, Faults and Warnings section for further details.

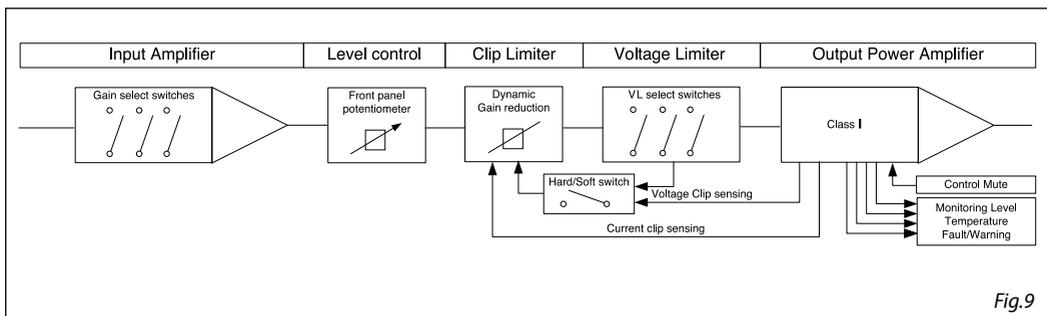


Fig.9

### Headroom, sensitivity and VL/Gain settings

The input amplifier and limiter system is designed to accommodate extremes of performance. Typically, exceeding maximum input by much as +10dB will only result in a 1% increase in distortion. The following schematics illustrate how the adjustable VL and Gain circuitry affect input sensitivity and output power.

The chart to the follow of the drawing below show input sensitivity with a 8 ohm load ad and 150V peak (max.) and 38V peak (min.) respectively for the eight different gain stages between +23dB and +44dB. The resulting output power is displayed in dBu,  $V_{rms}$  and watts in the tables to the far right.

The headroom available through the input stage to the clip limiter is shown by the dotted lines as +10 dB at 150V peak and +16.1dB at 38V peak. These lines illustrate the additional signal level that can be accepted at the input before any significant distortion will appear at the input stage.

If you use the level potentiometer in the signal chain to reduce the level by an amount greater than the headroom relative to input sensitivity, AND you drive the amplifier to clip level, you are in danger of clipping the input stage before the current or voltage peak limiters are activated.

When bridging two channels, you must add +6dB to the input sensitivity to achieve maximum output voltage due to the automatic -6dB gain compensation inserted by the amplifier.

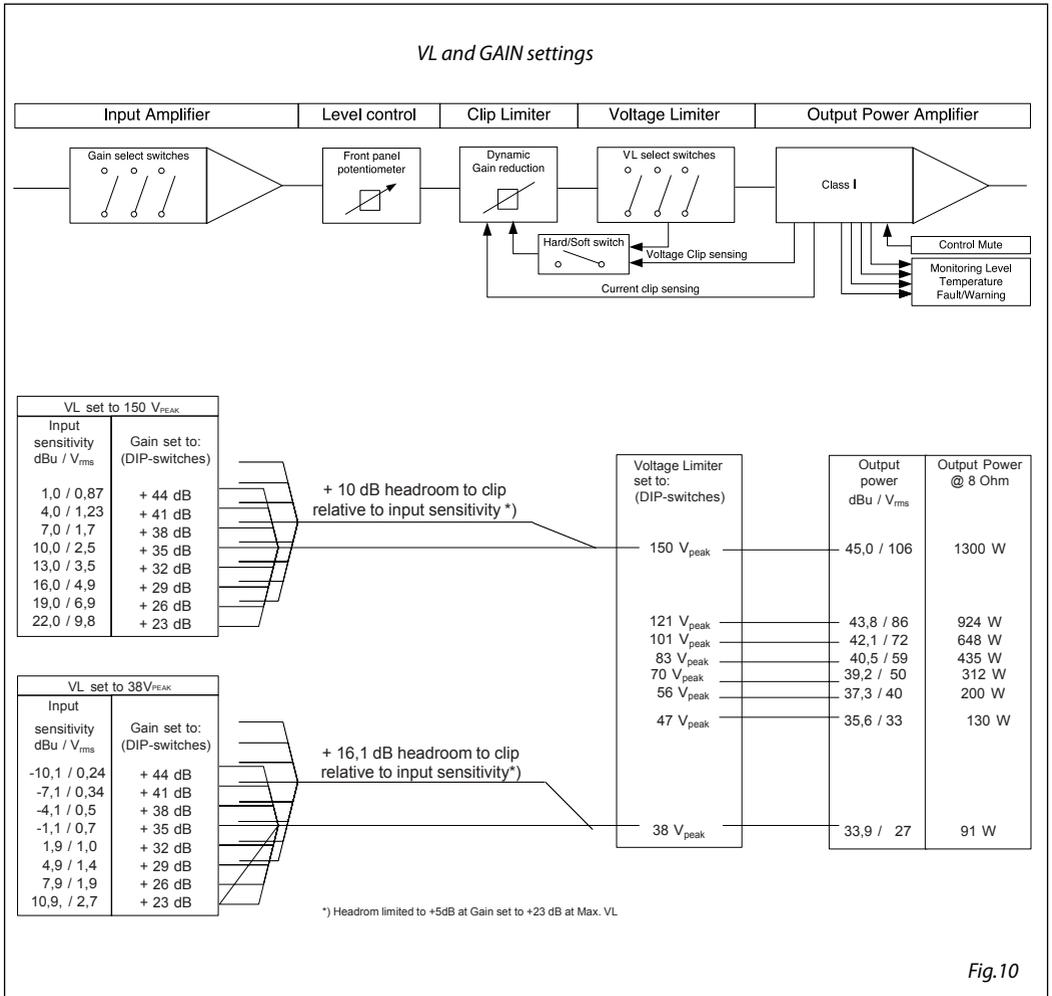


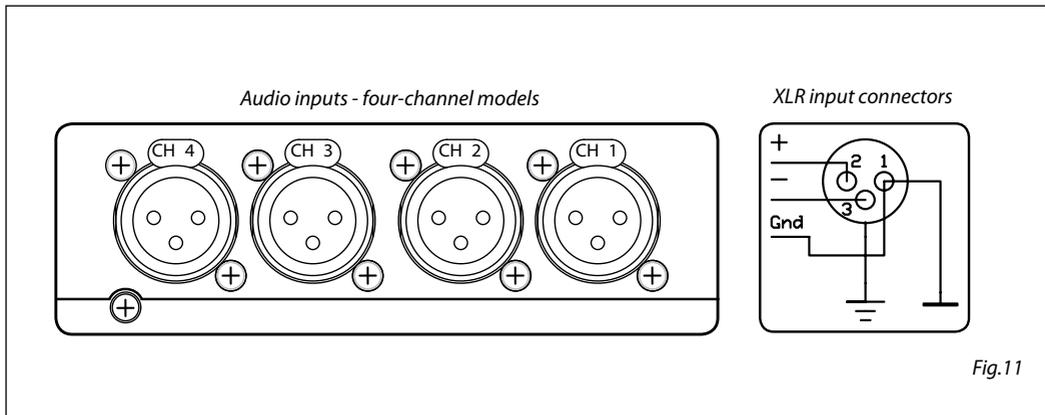
Fig.10

### 3.4 AUDIO INPUT AND OUTPUT CONNECTIONS

#### Balanced Input connections

The XLR input connectors are electronically balanced, and wired according to the IEC 268 standard (pin 2 = hot). XLR input connectors should be wired as follows:

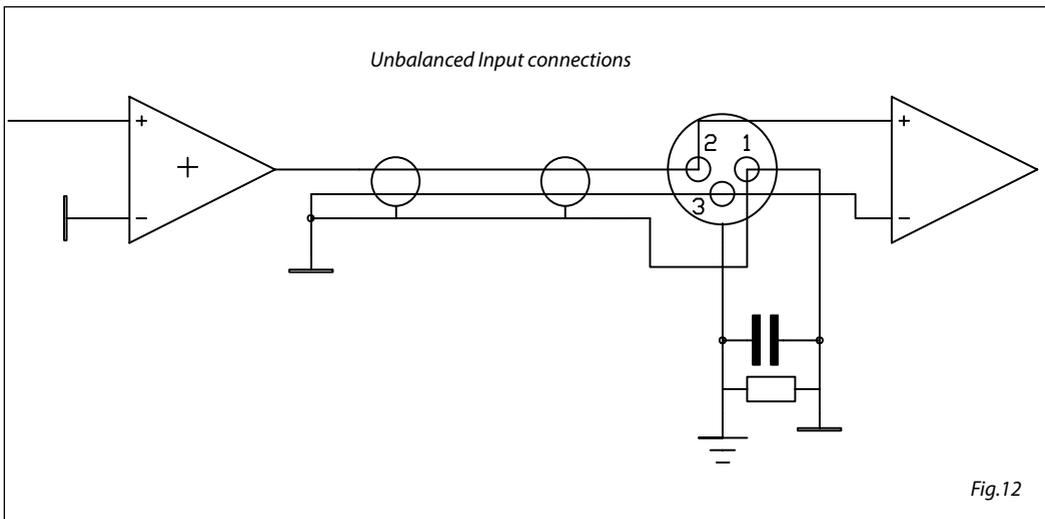
- Pin 1 Ground/Shield
- Pin 2 Hot (+)
- Pin 3 Cold (-).



When linking the same source signal to several input channels, be aware that there is a limit to the number of channels an output source can drive. A typical output source (e.g. a DSP crossover unit) can drive up to four amplifier channels before external line-drivers might be required to buffer the signal.

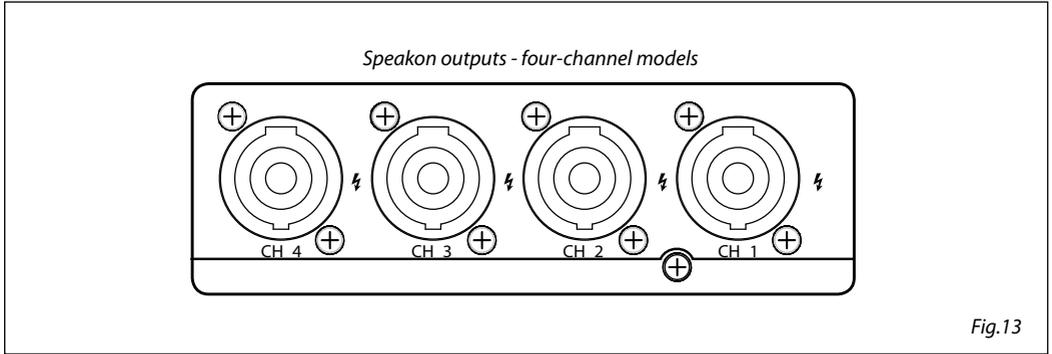
#### Unbalanced Input connections

To connect an input to an unbalanced source, it is possible to connect pins 1 and 3 in the XLR plug at the amplifier end of the cable. However, a better method is to connect pin 3 to the shield at the source end of the cable, as this usually results in better hum and noise rejection. Balanced input connections are recommended whenever possible.

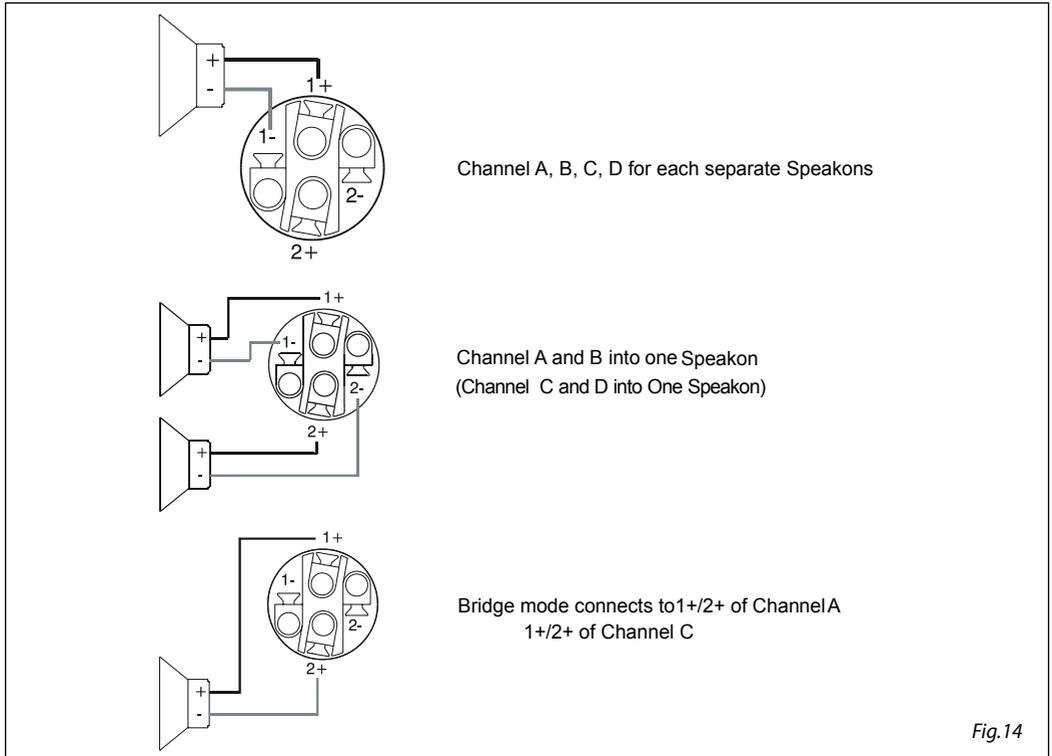


### Speakon Output connections

Amplifier is equipped with the Speakon output connectors.



Four -channel amplifiers are wired in the following manner. The right Speakon connector, Channel A+B, provides outputs for both Channel A and Channel B. This output is useful when wiring the amplifier for bridged mono operation. See section 3.4. The left Speakon connector provides an output for Channel B only. Connect the + and - loudspeaker cables as shown in the illustrations below.



Never connect an output terminal to ground, or to any other input or output. Observe relative loudspeaker polarity: loudspeakers connected in reverse polarity will exhibit degraded performance, particularly in bass frequencies, and may be damaged as a consequence.

Use a high-quality stranded loudspeaker cable, and keep cable runs as short as possible.

### **Output bridge mode**

When bridged, the input source must be connected to input A (A+B) or C (C+D) respectively. Output speaker cables must be connected to the bridge on channel 1+2+ of channel 1 and 3+/4.+ of channel 4. The main benefit of bridging the output is a doubling of output voltage. Bridging can be used to turn a four-channel by amplifier, for example into a three-channel amplifier with 2 x 1300W and 1 x 4200W at 8 ohms or 2 x 2100W and 1 x 5000W at 4 ohms. Most power amplifier designs, when bridged, automatically introduce a +6 dB input gain boost which can lead the user to conclude that said amplifier delivers more than double the power when in bridge mode. This is clearly not the case, as the gain boost artificially enhances perceived power at the cost of headroom. The amplifiers work on globally set constant gain, and automatically compensate the input gain by -6dB. For example, if the amplifier is configured in a three-channel mode, then the selected gain is maintained from input to output on all channels.

### **Amplifier Gain**

The amplifiers feature adjustable input gain. This versatility enables the amplifier to accommodate a multitude of system configurations with various input sources and speaker layouts. Amplifier gain is set globally for all channels. The range is +23dB to +44dB in 3dB steps. Individual channel fine level adjustment is available using the potentiometers on the front panel.

The unique adjustable input gain feature of the amplifier makes it easier to attain the optimum balance between headroom and signal-to noise ratio in the signal path. A weak signal at the input might require the gain to be raised in order to achieve maximum output power with the lowest signal-to-noise ratio. A hot input signal, however, would require a lowering of the gain to avoid sending the amplifier into Voltage or Current clipping. See Appendix to review the table containing Gain versus VL setting implications for input sensitivity and output power. Bridge mode operation automatically compensates by -6dB, keeping all channels at the same gain.

### **Channel gain/level (front-panel pots)**

Individual channel gain (level) may be adjusted using the potentiometers located on the front panel. Range is from 0dB to -infinity. The attenuation is -10dB.

If the level control is used to attenuate to a lower level than the headroom relative to input sensitivity AND the amplifier input is driven into clip, there is a danger of clipping the input stage before the current or voltage limiters are activated.

### **Amplifier sensitivity**

Sensitivity is defined as how many Volts (rms) or dBu (referred to 0.775V rms) are required to achieve full (maximum) output power. As the output power varies with the load impedance, 4 ohms is usually the common reference. Since the amplifiers are capable of providing multiple maximum output power levels through use of the VL feature, many sensitivity calculations may be required for a single amplifier.

### **Output Voltage Limiter (VL)**

Voltage Limiter (VL) is a unique feature in amplifiers. It is used to select the maximum power available on each output channel. VL levels are set using the rear-panel DIP-switches; eight level positions are offered. The values for VL are displayed as maximum Voltage Peak. To translate Voltage Peak into  $V_{rms}$ , you must divide the Voltage Peak values by 1.41 (see table). The VL allows you to set the correct maximum output peak power for optimum performance with the connected speakers. The correct setting depends on the system type and the specific load connected to the channel. Since each channel can be configured to deliver either very high voltage peak power OR high current draw at low-impedances, it is important to set the VL correctly. If you choose a lower VL setting, you only reduce the maximum output voltage. At the same time, this allows more current headroom for low-impedance loads. The amplifier thus runs at higher efficiency, with a significantly reduced risk of going into thermal protection.

<b>V peak (VL)</b>	<b>V rms</b>
150	106
121	86
101	72
83	59
70	50
56	40
47	33
38	27

### **Output Current Peak Limiter (CPL)**

The Current Peak Limiter (CPL) ensures that the amplifier will not be damaged by forcing the amplifier to deliver current levels to the outputs that exceed the physical limits of the transistors. The CPL keeps the amplifier within the Safe Operating Area (SOA.)

The CPL is non-adjustable and has different limit values depending on model type.

CPL activity is indicated by illumination of an orange LED for each channel on the front panel.

A steadily illuminated orange CPL LED (with MUTE illuminated) indicates a short circuit situation (or very low-impedance). The output will mute for 6 seconds before measuring the output impedance again. This will continue until the short circuit is fixed, at which time the output will automatically un-mute. An input signal must be present to allow detection of short circuit or low-impedance conditions.

The problem can be solved by checking input and output cables and examining the state of the loud-speaker load. If there is no short circuit present, then the condition may be rectified by lowering the VL or input levels.

### 3.5 PROTECTION, FAULTS AND WARNINGS

#### Introduction

The amplifier incorporate a sophisticated and comprehensive set of protection features. Faults and warnings are indicated on the front panel and reported.

#### Safe Operating Area detector (SOAD)

The Safe Operating Area Detector (SOAD) compares output voltage against output current to ensure that the output transistors are working inside their safe operating area.

The SOAD provides fault monitoring and input to the Current Peak Limiter (CPL). The SOAD has no dedicated indicator, and its operation is revealed only in conjunction with features such as the CPL.

#### Very high frequency (VHF) protection

The amplifier include protection circuits that detect continuous Very High Frequency content in the input signal. The detection begins at approximately 10KHz and moves upwards to include ultrasonic signals. If VHF signals are detected, output will mute for 6 seconds before re-measuring.

Once no continuing VHF signal is detected, the output un-mutes and returns to normal operation.

This feature recognizes that continuous full-scale VHF signals do not appear in natural sources such as music. Any such signals can therefore be considered as a fault when present. VHF protection is essential in avoiding damage to high frequency drivers.

The VHF protection operational area is dependent on the output power level and frequency. The illustration below shows a decreasing threshold on the output power level, starting at approximately 10KHz and rising with a -6dB slope. This defines the VHF protection area. When continuous output power above the threshold line is detected the VHF protection becomes active.

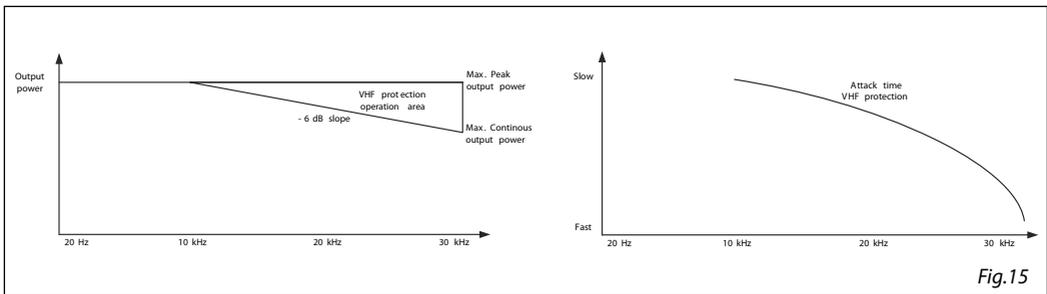


Fig.15

The Attack time for the VHF protection is increasingly shorter at higher frequencies. For example, an ultrasonic continuous signal will cause the outputs to mute rapidly, where it will take several milliseconds for a 10KHz continuous signal to trigger the output mute. This is shown in the illustration above.

The VHF protection is NOT a limiter and does not alter the amplifier's frequency response it is implemented solely to detect continuous VHF content. The amplifier will always pass VHF peaks at full power, with no effect on musical "transients".

The VHF protection is indicated by a red LED on the amplifier front panel, with output muting for 6 seconds when in action. If you bench test the amplifier using a continuous, full scale sine-wave input above 10KHz, the VHF protection will activate and prevent measurement of full peak output power. (Output will be muted long before maximum output power is attained.) To measure the true peak output power, use a burst signal.

#### DC protection

DC protection is implemented on each output to prevent damage to connected loudspeakers. DC present at the output will trigger muting and illuminate the fault LED indicator. Any DC present at the output indicates a hardware malfunction that requires servicing of the amplifier.

**Safe Operating Area detector (SOAD)**

The Safe Operating Area Detector (SOAD) compares output voltage against output current to ensure that the output transistors are working inside their safe operating area.

The SOAD provides fault monitoring and input to the Current Peak Limiter (CPL). The SOAD has no dedicated indicator, and its operation is revealed only in conjunction with features such as the CPL.

**High-impedance warning (open load)**

A high-impedance (open load) condition is indicated when an input signal above approximately -29dB is detected and no functioning loudspeakers are connected to the amplifier. The fault is indicated by a red Sig/Hi-imp LED. The indicator is green when a valid load is present under the same input signal conditions. Since the Hi - impedance detection initially triggers only when the input signal rises above -29dB, it might cause the indicator to first turn green, and then red, even in situations where no speaker is connected.

**Low-impedance protection warning**

A low impedance or short circuit fault is detected when current draw is high (Current Peak Limiter active) and when, simultaneously, output signal is low (-4dB LED does not illuminate). When this occurs, the amplifier protects the output stage from damage by muting the output signal and bypassing the circuits. Indication of this fault is a constant red illumination of the Current Peak

Limiter (CPL) LED on the front panel. The protection will sequence at 6 second intervals to re-measure conditions. If the low-impedance fault is no longer detected, the amplifier will un-mute.

If the CPL turns constant orange, the output is muted, and the -4dB signal LED is ON, then the amplifier has gone into maximum current protection. This situation is caused by an excessive input signal and is not due to a short circuit. Turn down the input signal to avoid or remedy this situation.

**Temperature protection**

If the temperature becomes too high to continue safe operation, the overheated output channel(s) will be muted until the temperature returns to an acceptable level.

Fully active temperature protection (with muting) is indicated by a constantly illuminated TEM LED.

Temperature measurements will continue at 6 second intervals. The output will un-mute when the channel or power supply returns to a safe operating temperature.

**Power Average Limiter (PAL )**

The Power Average Limiter (PAL) controls the current-drawing relationship between the power supply and the mains inlet. PAL limits the maximum average power consumption according to the power supply capabilities, ensuring that the PSU will not overload. In addition, in the larger models that potentially could pull more current from the mains than the mains fuses are specified to handle (more than 16 A), PAL limits the amplifier's maximum current draw to prevent blowing the mains fuse.

**Soft - Start**

High powered amplifiers with inadequate inrush limiting can pull considerable current from the mains at turn-on. This can result in tripping of fast acting mains breakers. Such is not the case with amplifiers. The amplifiers have very low inrush power as the capacitors are charged slowly and in a controlled manner ensuring that breakers will not trip.

## - 4 - MAINTENANCE AND SPECIFICATION

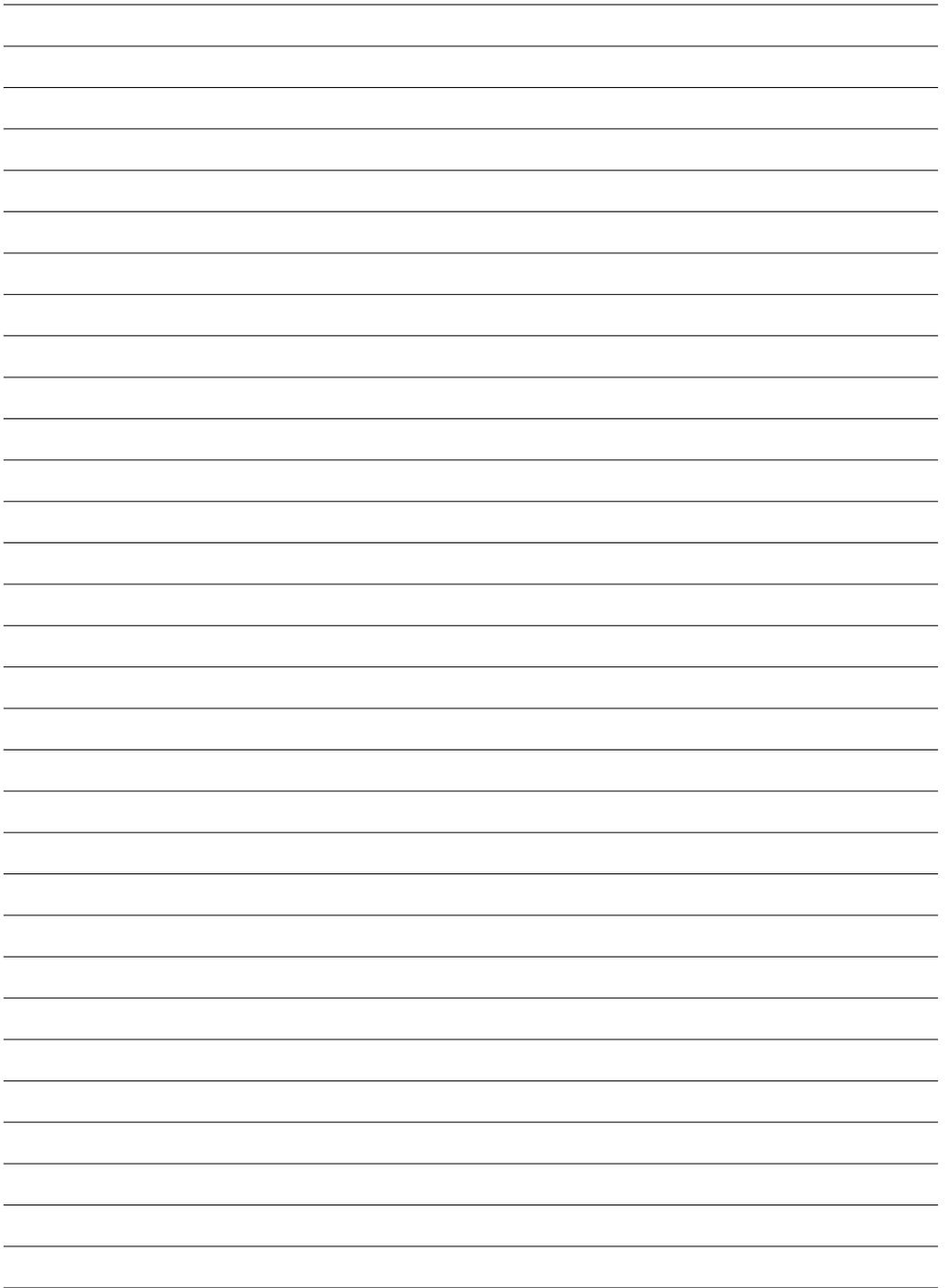
### 4.1 MAINTENANCE AND CLEANING THE UNIT

During normal operation your amplifier will provide trouble-free service. The only user maintenance required is to periodically vacuum clean the foam dust-filters behind the front grille.

In some extreme cases it may be necessary for authorized service personnel to clean the inside of the amplifier. These conditions usually occur after prolonged use in extreme environments such as those using cracked oil smoke machines. If you are using your amplifier in a heavy duty application, it is recommended to have your amplifier serviced every 1 years purely as a preventative action.

### 4.2 TECHNICAL SPECIFICATION

Technical Data	FZ10004
8 Ohm stereo power (all ch.s driven)	1300Wx4
4 Ohm stereo power (all ch.s driven)	2100Wx4
2 Ohm stereo power (all ch.s driven)	2500Wx4
4 Ohm bridge power (per ch.)	5000Wx2
Performance with Gain	35dB and VL:150 V
Frequency response	6.8Hz-34Khz@ 8 Ohm -3 dB
THD at 1 kHz and 1dB below clipping	<0.05%
Slew rate	>20V/us
Output impedance at 100 Hz	56m0hm
S/N rate	>112dB
Input gain	23-26-29-32-35-38-41-44 dB
Input impedance	20k0hm
Protection	Voltage Limiter, (VL) Over-heat, VHF, VLF Short-circuit, DC, Power Limiter (PL)
Power voltage / frequency	230V /50Hz
Dimensions (WxHxD)	482x88x430 mm
Net weight	13.50 Kg
Gross weight	15.50 Kg



**Il prodotto è coperto da garanzia in base alle vigenti normative. Sul sito [www.musiclights.it](http://www.musiclights.it) è possibile consultare il testo integrale delle "Condizioni Generali di Garanzia".**

**Estratto dalle**

**Condizioni Generali di Garanzia**

- Si prega, dopo l'acquisto, di procedere alla registrazione del prodotto sul sito [www.musiclights.it](http://www.musiclights.it). In alternativa il prodotto può essere registrato compilando e inviando il modulo riportato sul retro.
- Sono esclusi i guasti causati da imperizia e da uso non appropriato dell'apparecchio.
- La garanzia non ha più alcun effetto qualora l'apparecchio sia stato manomesso.
- La garanzia non prevede la sostituzione dell'apparecchio.
- Sono escluse dalla garanzia le parti esterne, gli altoparlanti, le manopole, gli interruttori e le parti asportabili.
- Le spese di trasporto e i rischi conseguenti sono a carico del possessore dell'apparecchio.
- A tutti gli effetti la validità della garanzia è avallata unicamente dalla presentazione del certificato di garanzia.

**The guarantee covers the unit in compliance with existing regulations. You can find the full version of the "General Guarantee Conditions" on our web site [www.musiclights.it](http://www.musiclights.it).**

**Abstract**

**General Guarantee Conditions**

- Please remember to register the piece of equipment soon after you purchase it, logging on [www.musiclights.it](http://www.musiclights.it). The product can be also registered filling in and sending the form available on your guarantee certificate.
- Defects caused by inexperience and incorrect handling of the equipment are excluded.
- The guarantee will no longer be effective if the equipment has been tampered.
- The guarantee makes no provision for the replacement of the equipment.
- External parts, loudspeaker, handles, switches and removable parts are not included in the guarantee.
- Transport costs and subsequent risks are responsibility of the owner of the equipment.
- For all purposes, the validity of the guarantee is endorsed solely on presentation of the guarantee certificate.

## CERTIFICATO DI GARANZIA GUARANTEE CERTIFICATE



Spett.le  
**Music&Lights S.r.l.**  
Via Appia Km 136.200  
04020 Itri (LT) Italy

Place Stamp Here  
Affrancare

MODEL / MODELLO

SERIAL N° / SERIE N°

Purchased by / Acquistato da

SURNAME / COGNOME

NAME / NOME

ADDRESS / VIA

N.

CITY / CITTÀ

ZIP CODE / C.A.P.

PROV.

Dealer's stamp  
and signature

Timbro e firma  
del Rivenditore

Purchasing date

Data acquisto

FORM TO BE FILLED IN AND MAILED / CEDOLA DA COMPILARE E SPEDIRE

MODEL / MODELLO

SERIAL N° / SERIE N°

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SURNAME / COGNOME

NAME / NOME

ADDRESS / VIA

N.

CITY / CITTÀ

ZIP CODE / C.A.P.

PROV.

Dealer's stamp  
and signature

Timbro e firma  
del Rivenditore

Purchasing date

Data acquisto

FORM TO BE FILLED IN AND KEPT / CEDOLA DA COMPILARE E CONSERVARE



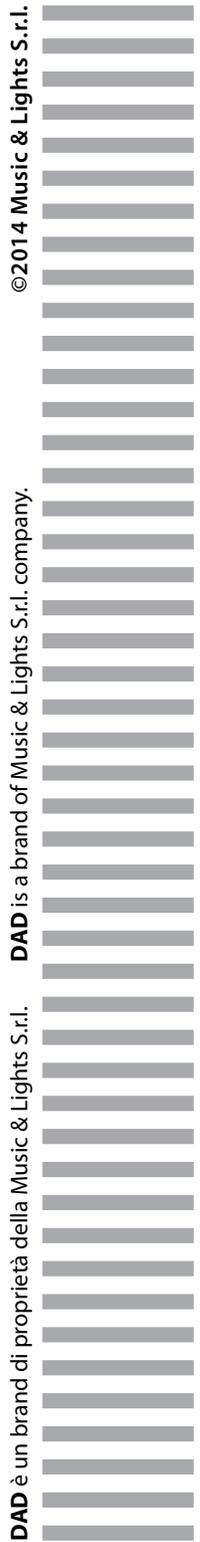
**MUSIC & LIGHTS S.r.l.**

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