



# K Series

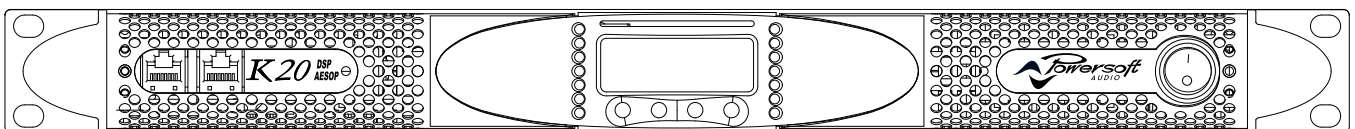
Série K

Serie K

QUICK GUIDE

GUIDE RAPIDE

GUÍA RÁPIDA



**K2, K3**

**K2 DSP+AESOP, K3 DSP+AESOP**

**K6, K8, K10**

**K6 DSP+AESOP, K8 DSP+AESOP, K10 DSP+AESOP**

**K20,**

**K20 DSP+AESOP**



# K Series

Série K  
Serie K

20

English

40

Française

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Español

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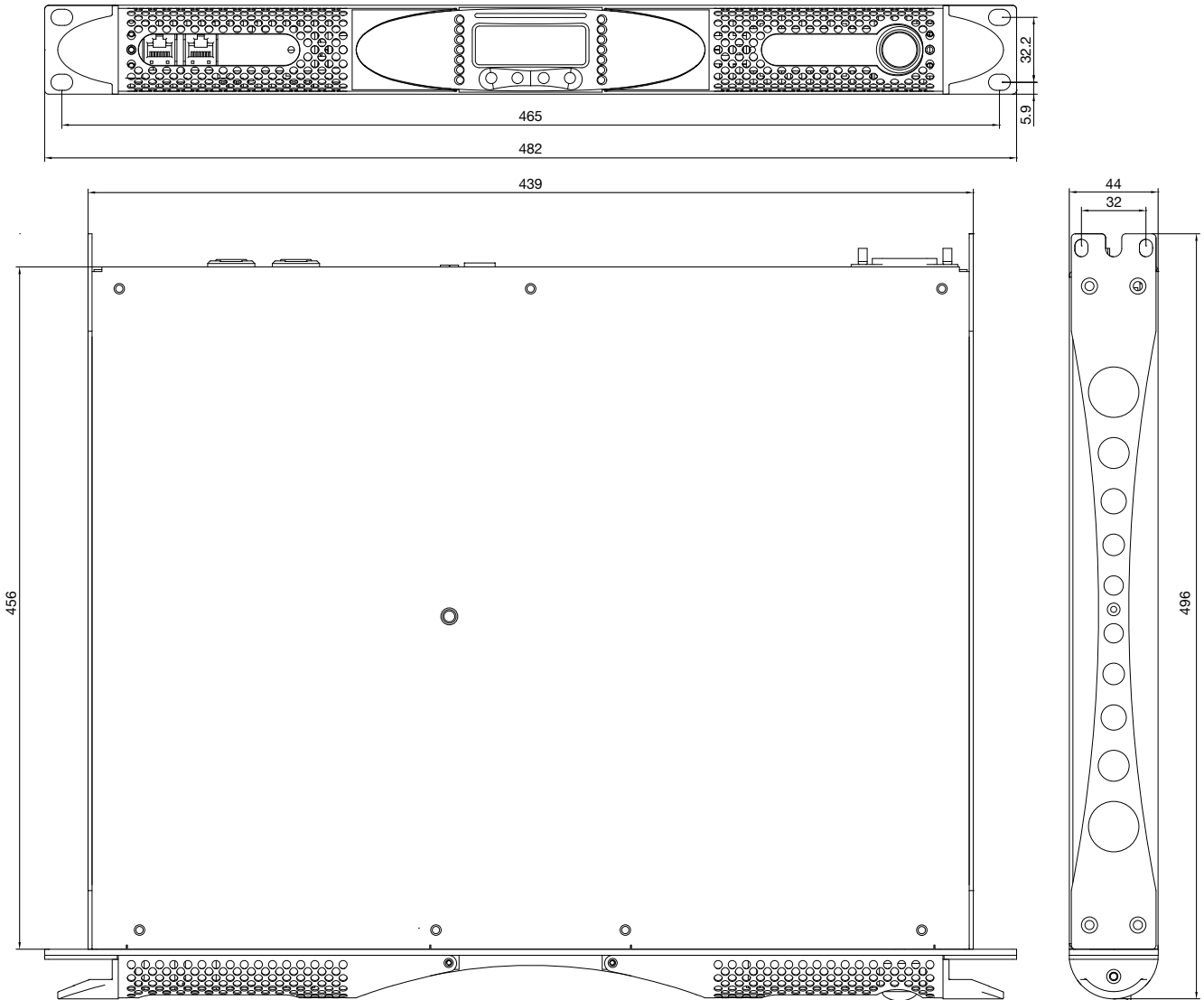
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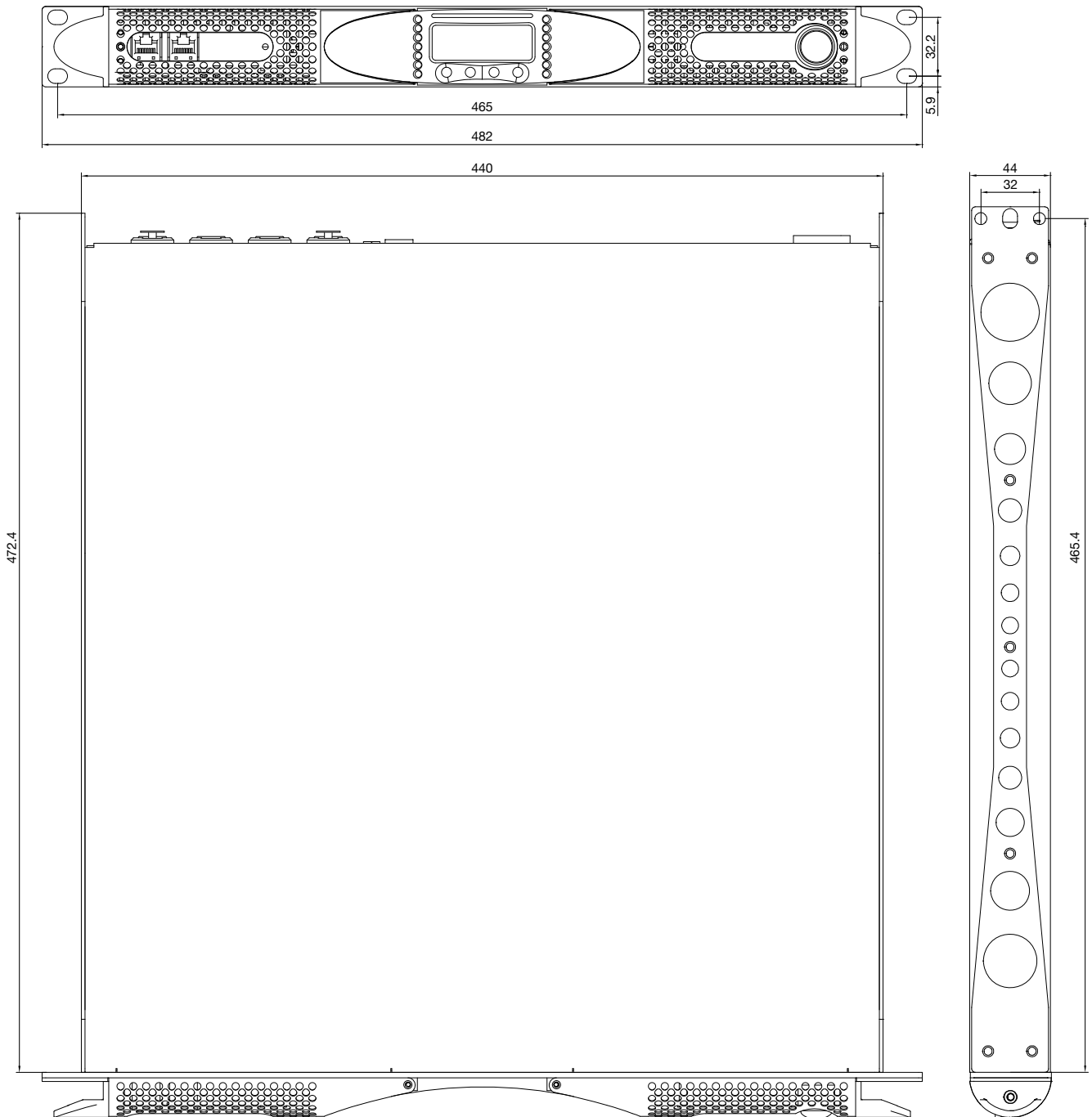
# A



**K2, K3**  
**K2 DSP + AESOP, K3 DSP + AESOP**

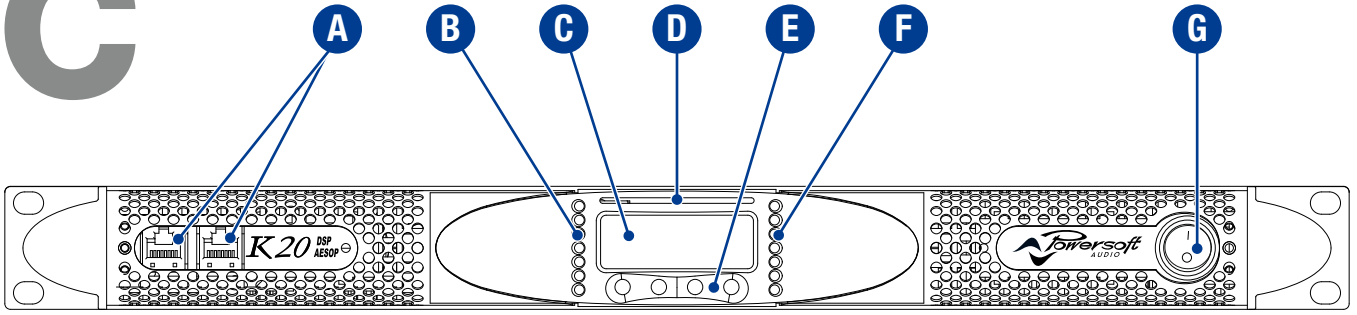


# B



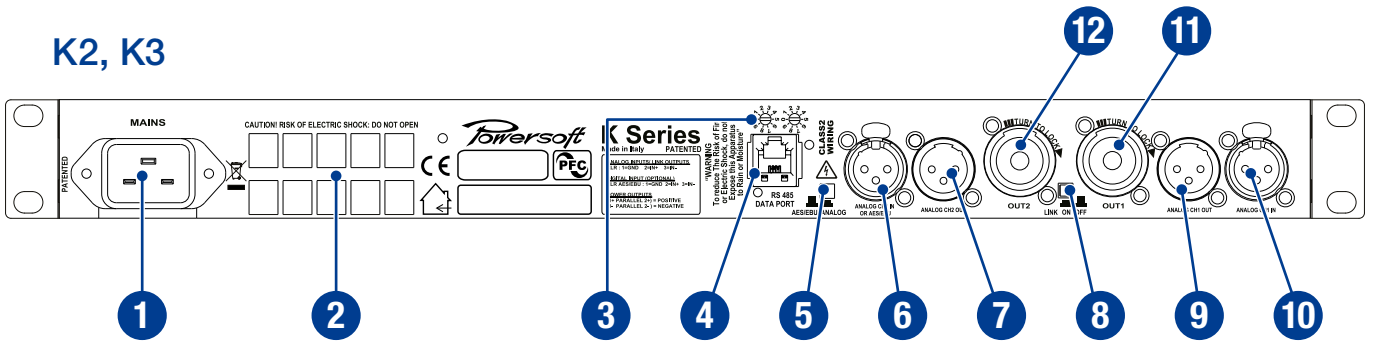
**K6, K8, K10,  
K6 DSP + AESOP, K8 DSP + AESOP, K10 DSP + AESOP  
K20  
K20 DSP + AESOP**

# C



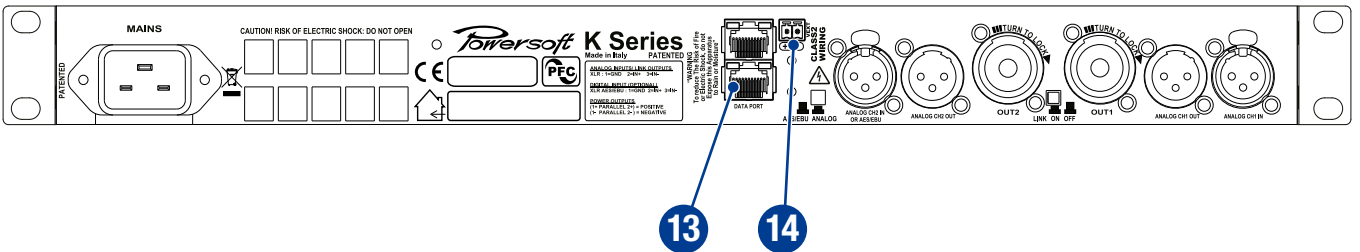
# D

## K2, K3



# E

## K2 DSP + AESOP, K3 DSP + AESOP



## English

### Front panel

- A. RJ45 plugs (either AESOP or RS485 ports according to the amplifier configuration)
- B. LED bar: signal metering channel 1
- C. Main display
- D. Smart Card slot
- E. Multifunction buttons
- F. LED bar: signal metering channel 2
- G. Main switch

### Rear panel

- 1. Mains inlet
- 2. Air vents
- 3. Serial ID selector for the RS485 port (non AESOP version only)
- 4. RS485 serial port (non AESOP version only)
- 5. AES3/analog switch for input 2
- 6. Input 2: channel 2 analog input in analog mode or AES3 input in AES3 mode, according to the position of the switch in #5
- 7. Line output channel 2
- 8. Link button: link input from channels 1 and 2
- 9. Line output channel 1
- 10. Input 1: channel 1 analog input
- 11. Speaker connector: output channel 1
- 12. Speaker connector: output channel 2
- 13. Ethernet+AESOP ports (AESOP version only)
- 14. Vext: 12 VDC, 1A external voltage input (AESOP version only)

## Française

### Panneau avant

- A. Connecteurs RJ45 (soit ports RS485 ou AESOP selon la configuration de l'amplificateur)
- B. Barre de LED : mesurer le signal du canal 1
- C. Écran principal
- D. Fente pour carte à puce
- E. Touches multifonctions
- F. Barre de LED : mesurer le signal du canal 1
- G. Interrupteur principal

### Panneau arrière

- 1. Entrée d'alimentation secteur
- 2. Bouches d'aération
- 3. Sélecteur d'ID série pour le port RS485 (Version non AESOP seulement)
- 4. Port série RS485 (version non AESOP seulement)
- 5. Commutateur AES3 / analogique pour l'entrée 2
- 6. Entrée 2 : le canal d'entrée 2 analogique en mode analogique ou l'entrée AES3 en mode AES3, selon la position du commutateur à # 5
- 7. Sortie ligne canal 2
- 8. Bouton Link : lien entrée des canaux 1 et 2
- 9. Sortie ligne canal 1
- 10. Entrée 1 : entrée analogique du canal 1
- 11. Connecteur de haut-parleur : sortie du canal 1
- 12. Connecteur de haut-parleur : sortie du canal 2
- 13. Ports Ethernet + AESOP (version AESOP seulement)
- 14. Vext : entrée de tension externe 12V DC, 1A (version AESOP uniquement)

## Español

### Panel Frontal

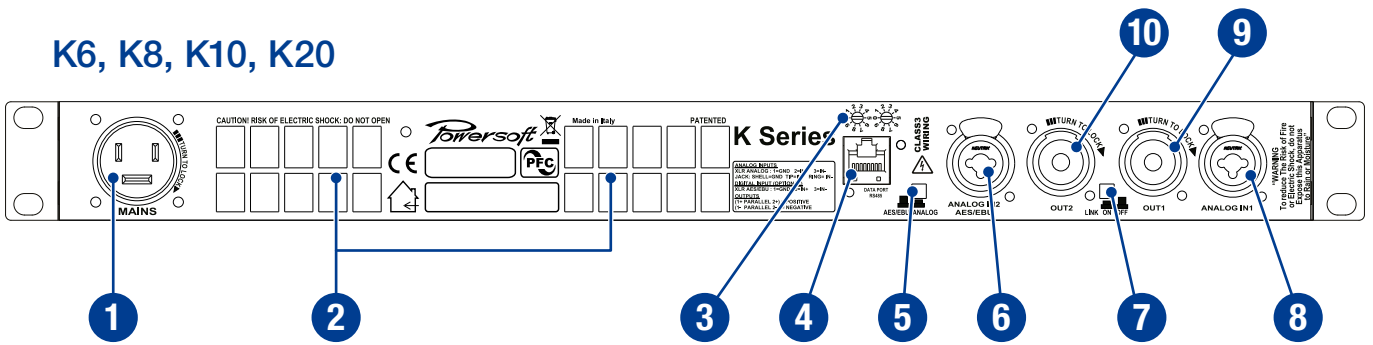
- A. Conectores RJ45 (ya sea AESOP o puertos RS485 de acuerdo con la configuración de amplificador)
- B. Barra LED: señal del canal 1
- C. Pantalla principal
- D. Ranura de tarjeta inteligente
- E. Multifunción
- F. Barra LED: señal del canal 2
- G. Interruptor principal de alimentación

### Panel Posterior

- 1. Conector de red de alimentación AC
- 2. Salidas de aire
- 3. Selector de ID para el puerto RS485 (Versión no AESOP solamente)
- 4. Puerto RS485 (Versión no AESOP solamente)
- 5. Interruptor AES3/análogica para la entrada 2
- 6. Entrada 2: canal de entrada 2 análogo en modo análogo o la entrada AES3 en el modo de AES3, según la posición del conmutador en el # 5
- 7. Canal de salida de línea 2
- 8. Conmutador de enlace: enlace de entrada de los canales 1 y 2
- 9. Canal de salida de línea 1
- 10. Entrada 1: canal de entrada 1 análogo
- 11. Conector de altavoz: canal de salida 1
- 12. Conector de altavoz: canal de salida 2
- 13. Puertos de ethernet+AESOP (Versión AESOP solamente)
- 14. Vext: 12 VDC, 1A entrada de tensión externa (Versión AESOP solamente)

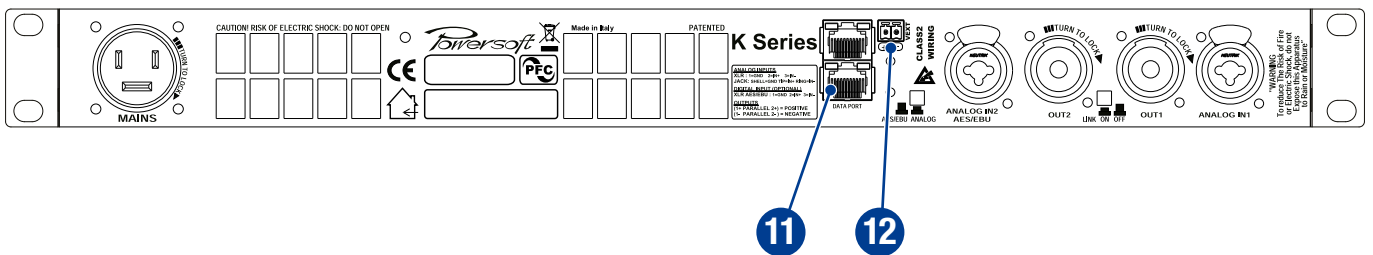
# F

## K6, K8, K10, K20



# G

## K6 DSP + AESOP, K8 DSP + AESOP, K10 DSP + AESOP, K20 DSP + AESOP



## English

### Rear panel

1. Mains plug
2. Air vents
3. Serial ID selector for the RS485 port (non AESOP version only)
4. RS485 serial port (non AESOP version only)
5. AES3/analog switch for input 2
6. Input 2: channel 2 analog input in analog mode or AES3 input in AES3 mode, according to the position of the switch in #5
7. Link button: link input from channels 1 and 2
8. Input 1: channel 1 analog input
9. Speaker connector: output channel 1
10. Speaker connector: output channel 2
11. Ethernet+AESOP ports (AESOP version only)
12. Vext: 12 VDC, 1A external voltage input (AESOP version only)

## Française

### Panneau arrière

1. Entrée d'alimentation secteur
2. Bouches d'aération
3. Sélecteur d'ID série pour le port RS485 (Version non AESOP seulement)
4. Port série RS485 (version non AESOP seulement)
5. Commutateur AES3 / analogique pour l'entrée 2
6. Entrée 2 : le canal d'entrée 2 analogique en mode analogique ou l'entrée AES3 en mode AES3, selon la position du commutateur à # 5
7. Bouton Link : lien entrée des canaux 1 et 2
8. Entrée 1 : entrée analogique du canal 1
9. Connecteur de haut-parleur : sortie du canal 1
10. Connecteur de haut-parleur : sortie du canal 2
11. Ports Ethernet + AESOP (version AESOP seulement)
12. Vext : entrée de tension externe 12V DC, 1A (version AESOP uniquement)

## Español

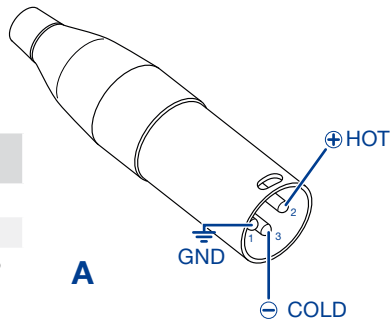
### Panel Posterior

1. Conector de red de alimentación AC
2. Salidas de aire
3. Selector de ID para el puerto RS485 (Versión no AESOP solamente)
4. Puerto RS485 (Versión no AESOP solamente)
5. Interruptor AES3/analogica para la entrada 2
6. Entrada 2: canal de entrada 2 análogo en modo analógico o la entrada AES3 en el modo de AES3, según la posición del conmutador en el # 5
7. Conmutador de enlace: enlace de entrada de los canales 1 y 2
8. Entrada 1: canal de entrada 1 análogo
9. Conector de altavoz: canal de salida 1
10. Conector de altavoz: canal de salida 2
11. Puertos de ethernet+AESOP (Versión AESOP solamente)
12. Vext: 12 VDC, 1A entrada de tensión externa (Versión AESOP solamente)

# H

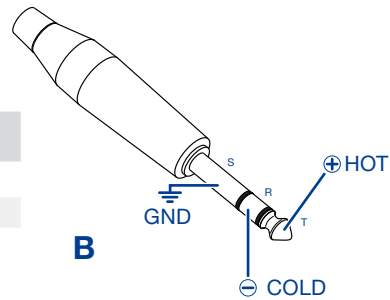
## Analog input XLR-M pinout

|       |        |
|-------|--------|
| Pin 1 | GND    |
| Pin 2 | HOT ⊕  |
| Pin 3 | COLD ⊖ |



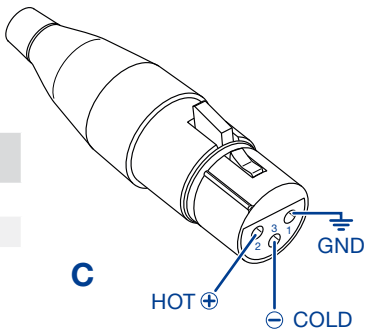
## Analog input TRS Jack pinout

|        |        |
|--------|--------|
| Tip    | HOT ⊕  |
| Ring   | COLD ⊖ |
| Sleeve | GND    |

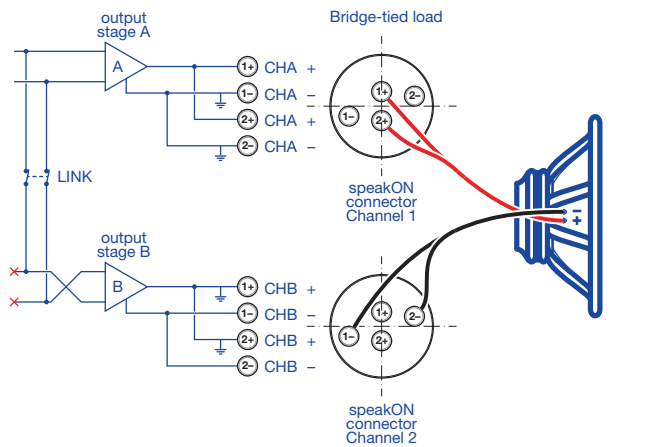
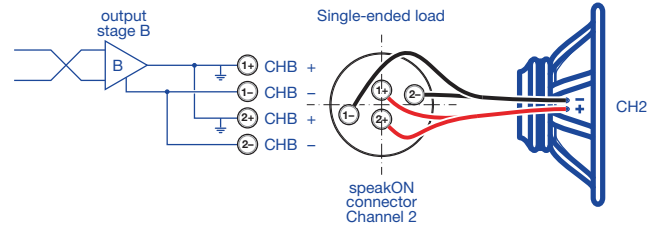
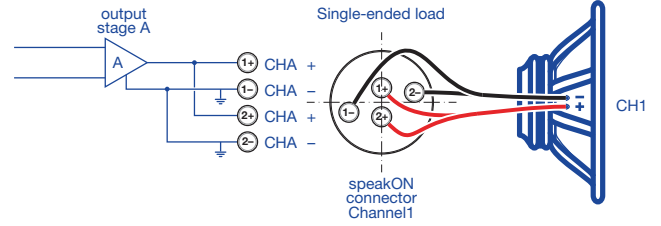


## Analog line output XLR-F pinout

|       |        |
|-------|--------|
| Pin 1 | GND    |
| Pin 2 | HOT ⊕  |
| Pin 3 | COLD ⊖ |



# I



# J

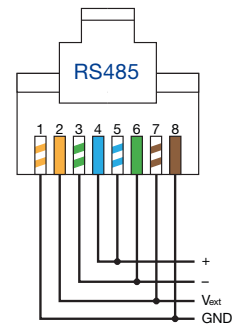


Color code (TIA/EIA-568-B)

Pin

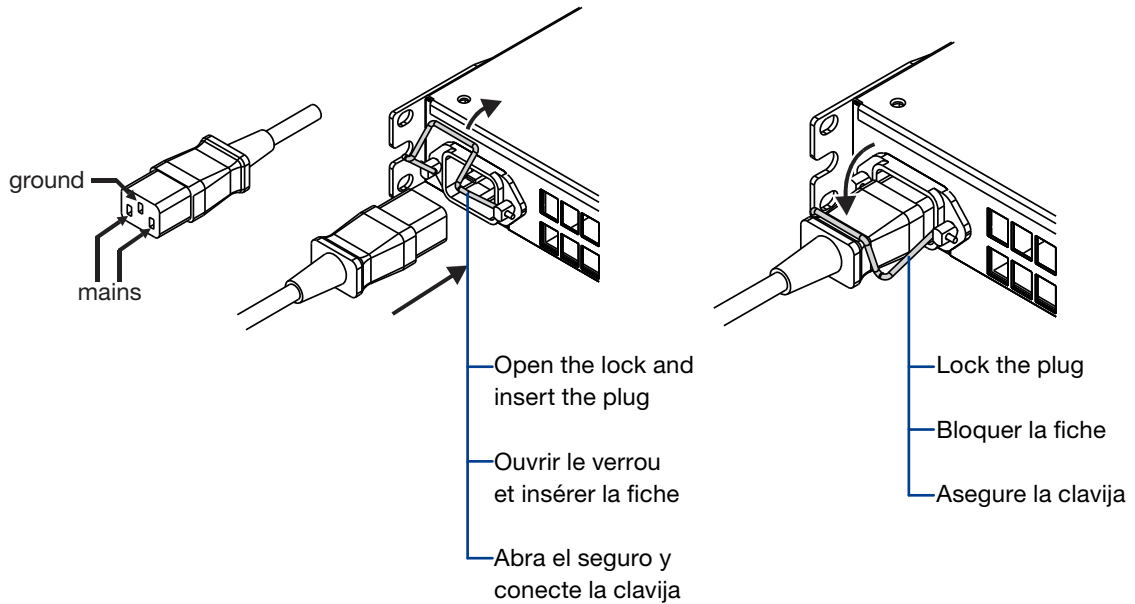
|  |                |   |
|--|----------------|---|
|  | ORANGE / WHITE | 1 |
|  | ORANGE         | 2 |
|  | GREEN / WHITE  | 3 |
|  | BLUE           | 4 |
|  | BLUE / WHITE   | 5 |
|  | GREEN          | 6 |
|  | BROWN / WHITE  | 7 |
|  | BROWN          | 8 |

# K

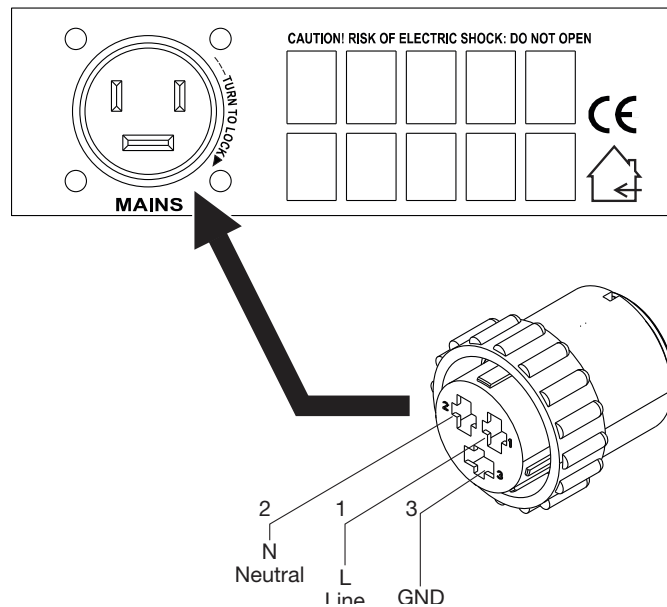




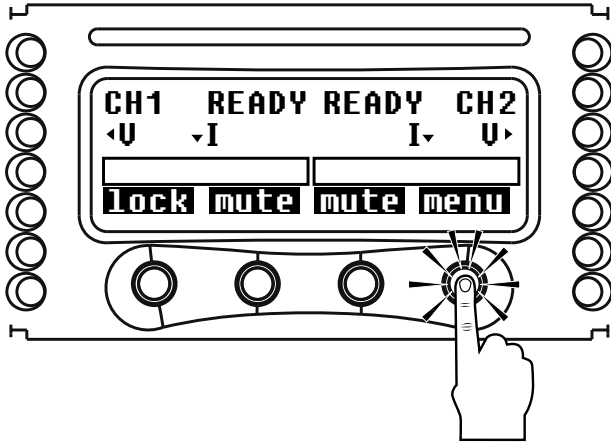
## K2, K3 K2 DSP + AESOP, K3 DSP + AESOP



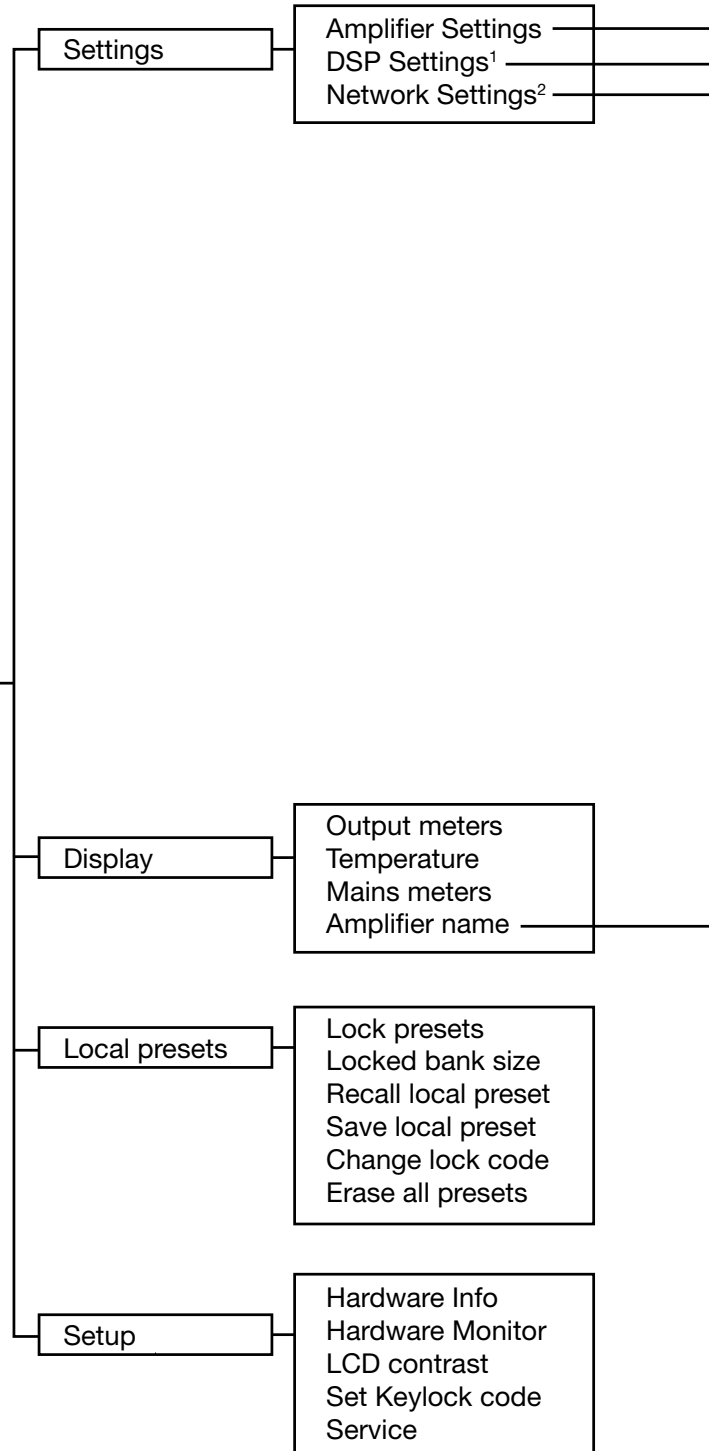
## K6, K8, K10, K20 K6 DSP + AESOP, K8 DSP + AESOP, K10 DSP + AESOP, K20 DSP + AESOP



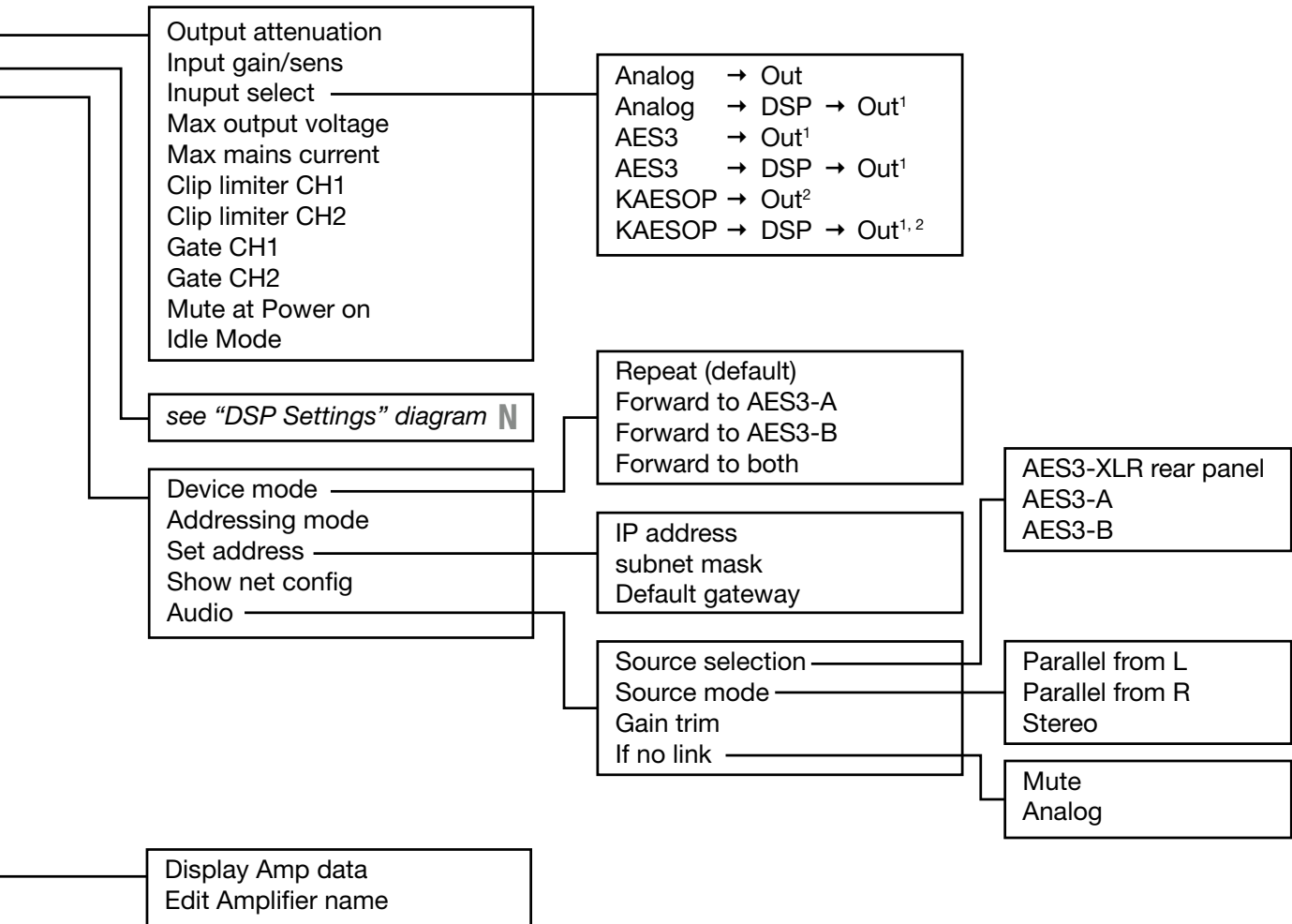
# M



## Menu



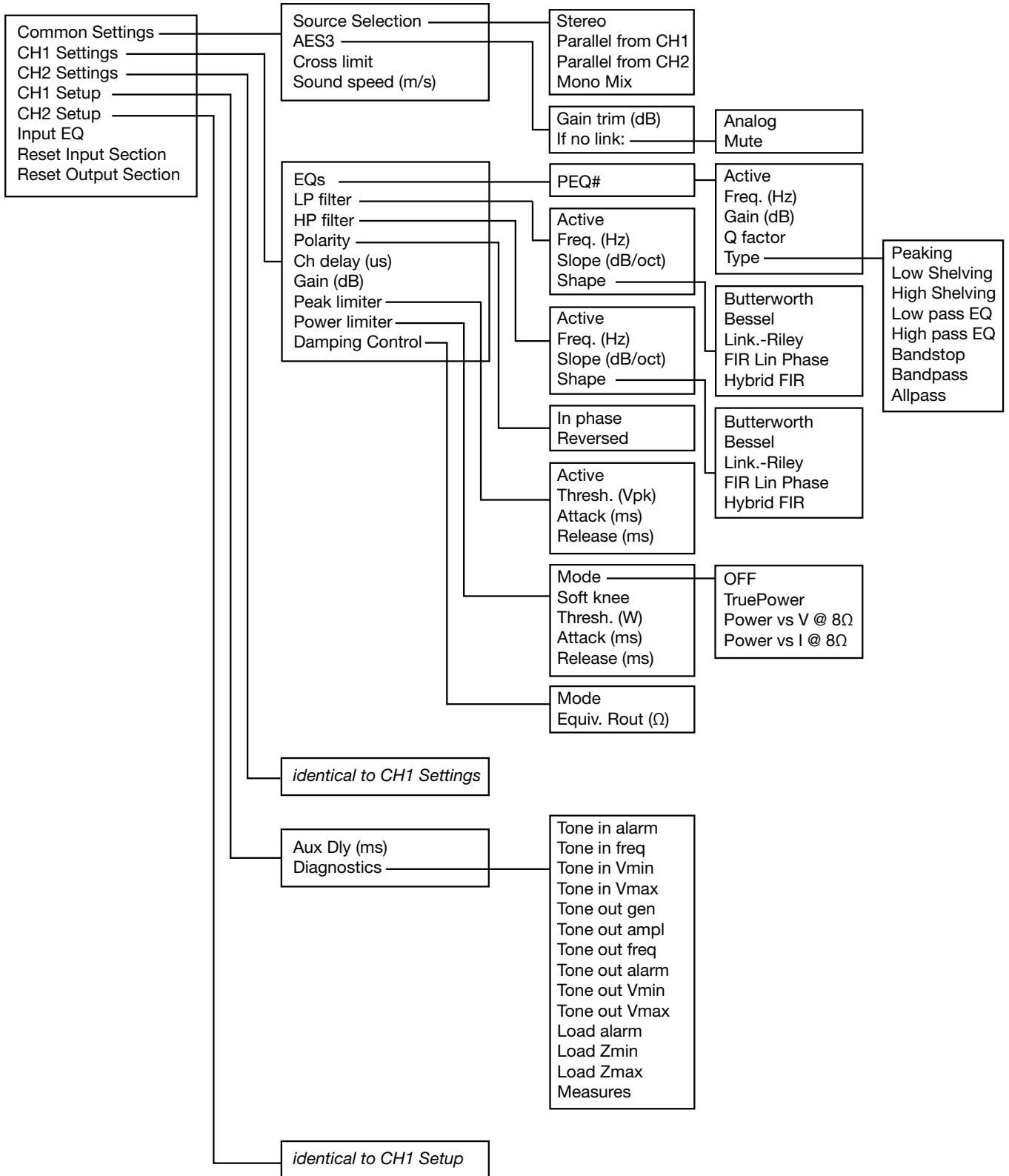


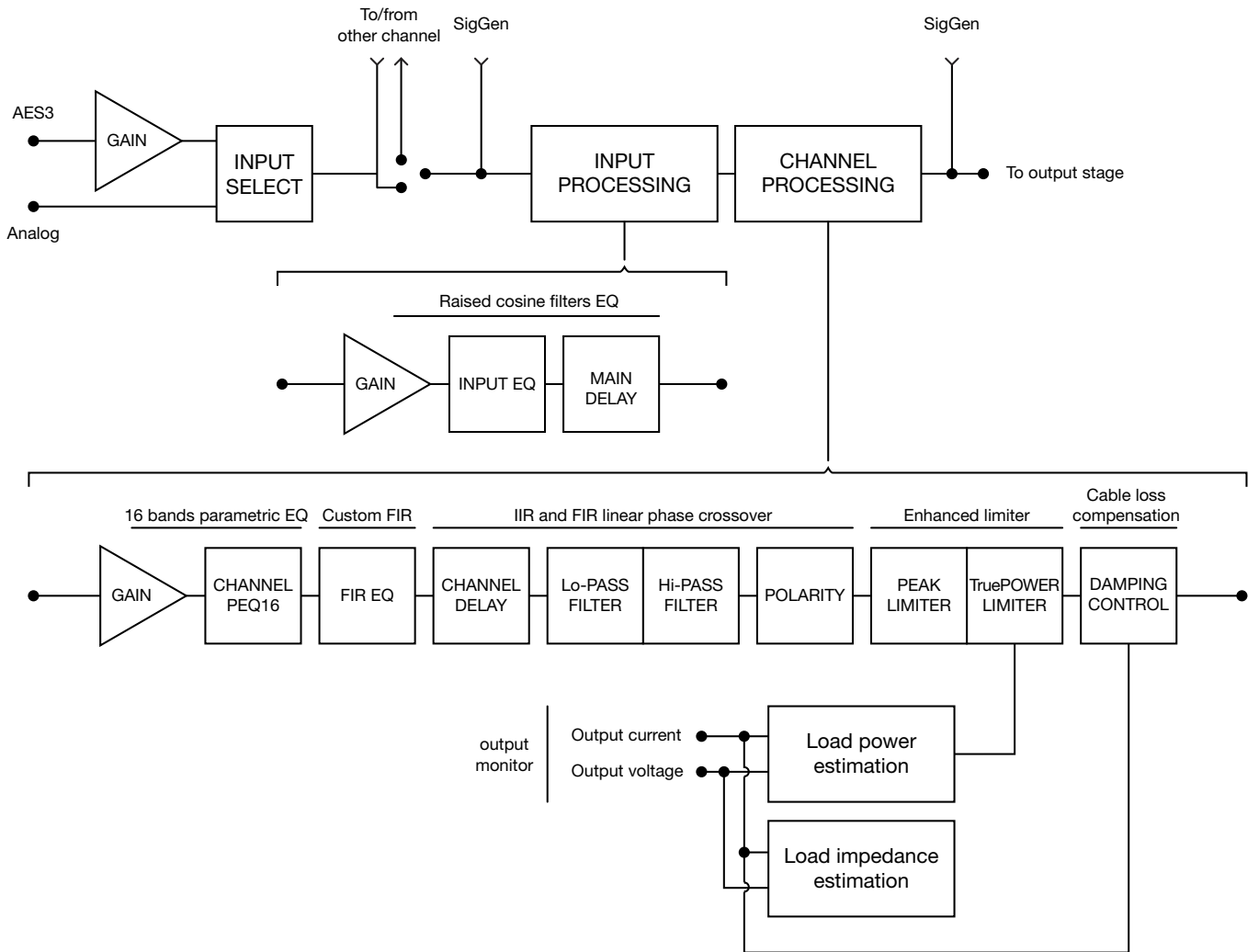
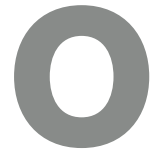


<sup>1</sup> Available only with optional KDSP board

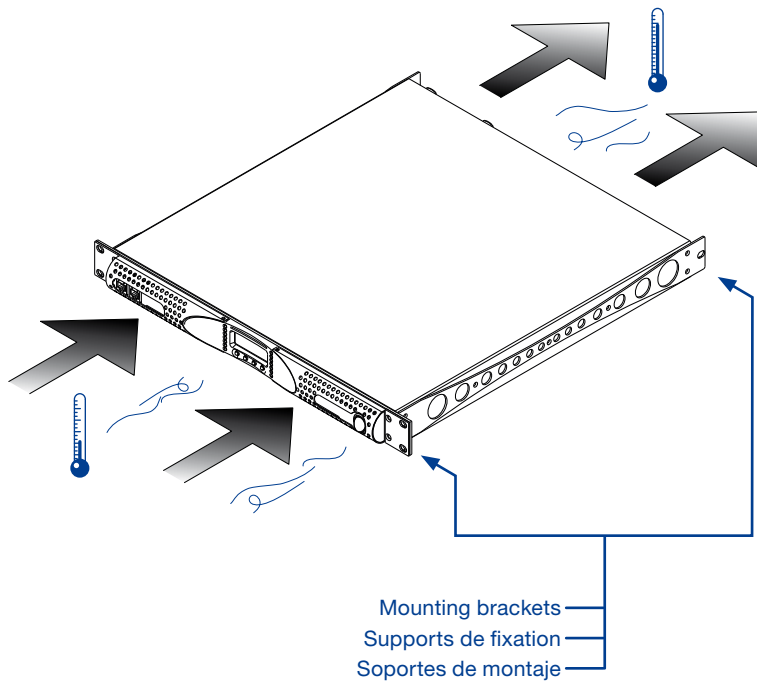
<sup>2</sup> Available only with optional KAESOP board

# N

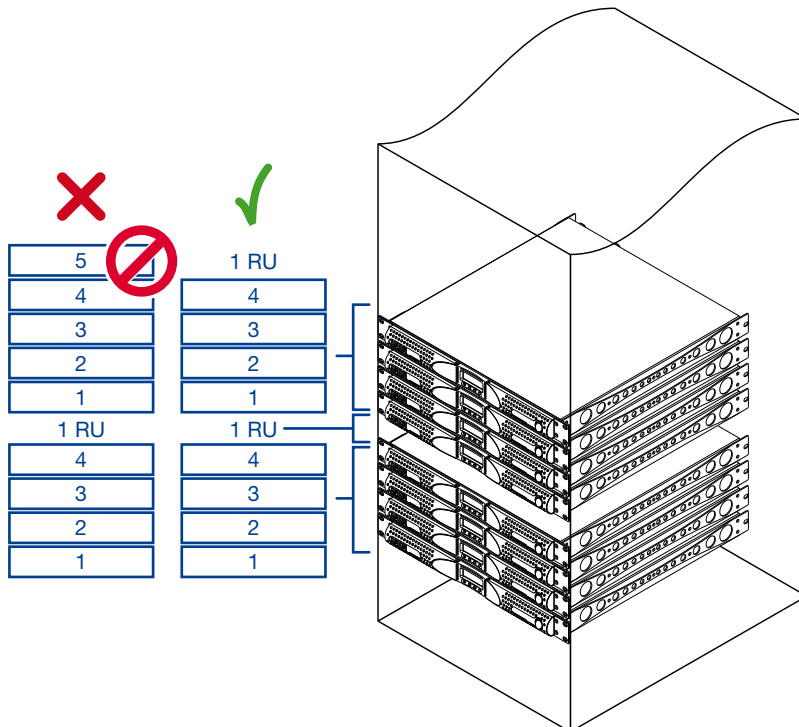




# P



# Q



# Regulatory information

# R

## WEEE DIRECTIVE

If the time arises to throw away your product, please recycle all the components possible.



This symbol indicates that when the end-user wishes to discard this product, it must be sent to separate collection facilities for recovery and recycling. By separating this product from other household-type waste, the volume of waste sent to incinerators or land-fills will be reduced and natural resources will thus be conserved.

The Waste Electrical and Electronic Equipment Directive (WEEE Directive) aims to minimise the impact of electrical and electronic goods on the environment. Powersoft S.p.A. comply with the Directive 2002/96/EC and 2003/108/EC of the European Parliament on waste electrical finance the cost of treatment and recovery of electronic equipment (WEEE) in order to reduce the amount of WEEE that is being disposed of in land-fill site. All of our products are marked with the WEEE symbol; this indicates that this product must NOT be disposed of with other waste. Instead it is the user's responsibility to dispose of their waste electrical and electronic equipment by handing it over to an approved reprocessor, or by returning it to Powersoft S.p.A. for reprocessing. For more information about where you can send your waste equipment for recycling, please contact Powersoft S.p.a. or one of your local distributors.

## EC DECLARATION OF CONFORMITY

**Manufacturer:**  
Powersoft S.p.A.  
via E. Conti 5  
50018 Scandicci (Fi)  
Italy



**We declare that under our sole responsibility the products:**

**Model Names:** K2, K3, K6, K8, K10, K20  
K2 DSP+AESOP, K3 DSP+AESOP,  
K6 DSP+AESOP, K8 DSP+AESOP, K10 DSP+AESOP,  
K20 DSP+AESOP.

**Intended use:** Professional Audio Amplifier

Are in conformity with the provisions of the following EC Directives, including all amendments, and with national legislation implementing these directives:

- ▶ 2006/95/EC Low Voltage Directive
- ▶ 2004/108/EC Electromagnetic Compatibility Directive
- ▶ 2002/95/CE RoHS Directive

The following armonized standards are applied:

- ▷ EN 55103-1
- ▷ EN 61000-3-2
- ▷ EN 61000-3-3
- ▷ EN 55103-2
- ▷ EN 61000-4-2
- ▷ EN 61000-4-3
- ▷ EN 61000-4-4
- ▷ EN 61000-4-5
- ▷ EN 61000-4-6
- ▷ EN 61000-4-11
- ▷ EN 60065


Scandicci,  
July 2014


  
Luca Lastrucci  
Managing Director


# Important safety instructions

# 1


## EXPLANATIONS OF GRAPHICAL SYMBOLS


 The triangle with the lightning bolt is used to alert the user to the risk of electric shock.


 The triangle with the exclamation point is used to alert the user to important operating or maintenance instructions.


 The CE-mark indicates the compliance with the low voltage and electromagnetic compatibility.

 Symbol for earth/ground connection.


 Symbol indicating that the equipment is for indoor use only.

 Symbol for conformity with Directive 2002/96/EC and Directive 2003/108/EC of the European Parliament on waste electrical and electronic equipment (WEEE).


 Do not use the unit at altitudes above 2000 m.


 Do not use the unit in tropical environment.


 WARNING: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT ATTEMPT TO OPEN ANY PART OF THE UNIT. NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

 TO COMPLETELY DISCONNECT THIS APPARATUS FROM THE AC MAINS, DISCONNECT THE POWER SUPPLY CORD PLUG FROM THE AC RECEPTACLE.\*

 THE MAINS PLUG OF THE POWER SUPPLY CORD MUST REMAIN READILY ACCESSIBLE.\*\*

 DO NOT EXPOSE THIS EQUIPMENT TO RAIN OR MOISTURE, DRIPPING OR SPLASHING LIQUIDS. OBJECTS FILLED WITH LIQUIDS, SUCH AS VASES, SHOULD NOT BE PLACED ON THIS APPARATUS

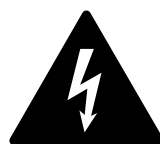
 K6, K8, K10 AND K20 MUST BE INSTALLED IN RACK CABINETS: INSTEAD OF CONNECTING THE AMPLIFIER TO THE POWER GRID DIRECTLY, PLUG THE AMPLIFIER'S MAINS CONNECTIONS VIA A SECTIONING BREAKER TO A POWER DISTRIBUTION PANEL INSIDE THE RACK CABINET.

 WHEN THE UNIT IS INSTALLED IN A CABINET OR A SHELF, MAKE SURE THAT IT HAS SUFFICIENT SPACE ON ALL SIDES TO ALLOW FOR PROPER VENTILATION (50 CM FROM THE FRONT AND REAR VENTILATION OPENINGS).

 CONNECTION TO THE MAINS SHALL BE DONE ONLY BY A ELECTROTECHNICAL SKILLED PERSON ACCORDING THE NATIONAL REQUIREMENTS OF THE COUNTRIES WHERE THE UNIT IS SOLD.

\* K6, K8, K10 and K20: interrupt the mains by switching the sectioning breaker off.


\*\* Valid for K2 and K3 model only; with K6, K8, K10 and K20 a free leads power cord (i.e. without plug) is provided: this solution is intended for connecting the device to a sectioning breaker on the mains. Refer to the installation instruction for selecting the proper sectioning breaker.



Electrical energy can perform many useful functions. This unit has been engineered and manufactured to ensure your personal safety. But IMPROPER USE CAN RESULT IN POTENTIAL ELECTRICAL SHOCK OR FIRE HAZARD.

In order not to defeat the safeguards incorporated into this product, observe the following basic rules for its installation, use and service. Please read these "Important Safeguards" carefully before use.

## Important safety instructions

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this equipment near water.
6. Clean only with a dry cloth.
7. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Only use attachments/accessories specified by the manufacturer.
12. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over. 
13. Unplug this apparatus during lightning storms or when unused for long periods of time.
14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

Numbers 9 and 13 apply only to K2 and K3.

## 2:1.Welcome

Congratulations on buying a Powersoft K Series amplifier! We know you are eager to use your new amplifier, but please take a moment to read this user's manual and safety instructions. In case you have any questions, please do not hesitate to contact your dealer or Power soft.

Powersoft K Series is the flagship of Powersoft's technologies, ranking in the "Top Class" amplification of the global pro audio market.

Offering various power ratings in 6 models ranging from 2 x 2400 W/ch @ 4 Ω to 2 x 9000 W/ch @ 2 Ω, still maintaining the 1 unit size, the K Series represents the milestone of switch mode amplification providing incredible power with the lowest weight and highest efficiency.

Suiting an unlimited range of PA applications such as opera houses, theaters, churches, cinema, and theme parks, K Series sonic performances became target for professional audio market.

Completely remotable by Armonía Pro Audio Suite, Powersoft K Series DSP+AESOP grants granular control over any parameter of the signal processing: input/output independent equalizers per channel providing PEQ, raised cosine, shelving IIR filters as well as custom output FIR filters, delay up to 1 s for time alignment, Active DampingControl™ for cable compensation, Power limiter (TruePower™, RMS voltage, RMS current) + Peak Limiter.

Furthermore, by using the Step-Up procedure it is possible to increase the output power without having to change amplifier.

K Series amplifiers are:

|     | K2<br>K2 DSP | K3<br>K3 DSP | K6<br>K6 DSP | K8<br>K8 DSP | K10<br>K10DSP | K20<br>K20DSP |
|-----|--------------|--------------|--------------|--------------|---------------|---------------|
| 8 Ω | 1000 W       | 1400 W       | 1300 W       | 1500 W       | 2000 W        | 2700 W        |
| 4 Ω | 1950 W       | 2600 W       | 2500 W       | 3000 W       | 4000 W        | 5200 W        |
| 2 Ω | 2400 W       | 2800 W       | 3600 W       | 4800 W       | 6000 W        | 9000 W        |

## 2:2.Unpacking & checking for shipping damage

Your Powersoft product has been completely tested and inspected before leaving the factory. Carefully inspect the shipping package before opening it, and then immediately inspect your new product. If you find any damage, notify the shipping company or reseller immediately.

The box contains the following:

- ▶ 1x K Series amplifier.
- ▶ 1x AC mains power cord
- ▶ 1x quick guide

## 2:3.Disposal of the packaging material

The protective transport packaging has been selected from materials which are environmentally friendly for disposal and can normally be recycled.

**Rather than just throwing these materials away, please ensure they are offered for recycling.**

## 2:4.List of image panels

- A. K2, K3 mechanical drawings (dimensions in mm)
- B. K6, K8, K10, K20 mechanical drawings (dimensions in mm)
- C. K Series front panel
- D. K2, K3 rear panel
- E. K2 DSP+AESOP, K3 DSP+AESOP rear panel
- F. K6, K8, K10, K20 rear panel
- G. K6 DSP+AESOP, K8 DSP+AESOP, K10 DSP+AESOP, K20 DSP+AESOP rear panel
- H. Connectors pinout
- I. Output connections diagram
- J. RJ45 Ethernet pinout
- K. RJ45 RS485 pinout
- L. AC mains connections
- M. LCD: main settings menu diagram
- N. LCD: DSP settings menu diagram
- O. Signal processing diagram
- P. Mounting brackets and air flow direction
- Q. Rule for stacking amplifiers in closed racks
- R. Regulatory information

# Installation

## 3

### 3:1.Location

The intended use of K Series amplifiers is in a rack cabinets. The AC mains wirings of the units shall be connected to a power distribution panel inside the rack cabinet. In order to limit the risk of mechanical damages, the amplifiers must be fixed to the rack using both frontal and rear mounting brackets. We recommends to use eight M6 or 12-24 UNC-2B screws for threaded holes or cage nuts.

Install this amplifier as far as possible from radio tuners and TV sets. An amplifier installed in close proximity of such equipment may experience noise or generic performance degradation. Placing and using the amplifier for long periods of time on heat generating sources will affect its performance. Avoid placing the amplifier on heat generating sources.

### 3:2.Cooling

Install the amplifier in a well-ventilated location: the ventilation openings must not be impeded by any item such as newspapers, tablecloths, curtains, etc; keep a distance of at least 50 cm from the front and rear ventilation openings of the amplifier.

All Powersoft amplifiers implement a forced-air cooling system to maintain low and constant operating temperatures. Drawn by the internal fans, air enters from the front panel and is forced over all components, exiting at the back of the amplifier.

The amplifier's cooling system features "intelligent" variable-speed DC fans which are controlled by the heatsink temperature sensing circuits: the fans speed will increase only when the temperature detected by the sensors rises over carefully predetermined values. This ensures that fan noise and internal dust accumulation are kept to a strict minimum.

Should however the amplifier be subject to an extreme thermal load, the fan will force a very large volume of air through the heat sink. In the extremely rare event that the amplifier should dangerously overheat, sensing circuits shut down all channels until the amplifier cools down to a safe operating temperature. Normal operation is resumed automatically without the need for user intervention.

K Series amplifiers can be stacked one on top of the other due to the efficient cooling system they are equipped with.

There is however a safety limit to be observed: in case a rack with closed back panels is used, leave one rack unit empty every four installed amplifiers to guarantee adequate air flow (see [Panel Q, p. 18](#)).

### 3:3.Cleaning

Always use a dry cloth for cleaning the chassis and the front panel. Air filter cleaning should be scheduled according to the dust levels in the amplifier's operating environment.

**⚠ Disconnect the AC mains source before attempting to clean any part of the amplifier ⚠**

In order to clean the vent filters you need to remove the front cover: never attempt to open any other part of the unit.

By means of a screwdriver Phillips PH1, unscrew the screws that lock the left and right cover grills on the front panel (ref. [FIG. 1](#)), gently lift the covers and remove the filters. You may use compressed air to remove the dust from filters, or wash it with clean water: in the latter case ensure that the filters are dry before reassembly.

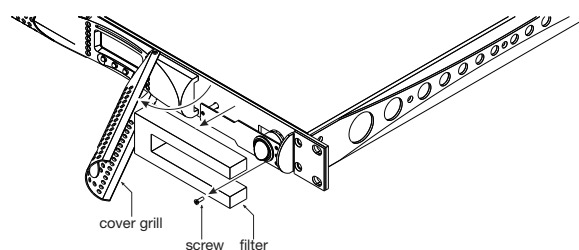


FIG. 1: Cleaning air filters.

### 3:4.AC mains supply

The AC Main connection is made via the

- ▶ AMP CPC 45A connector in K6, K8, K10 and K20;
- ▶ IEC C20 connector in K3 and K2.

The power cord type provided with the amplifier are

- ▶ LAPP OLFLEX191 3G6 / SJT 3XAWG10 for K6, K8, K10 and K20.
- ▶ Bahoing SJT 3x16AWG or I-sheng SGIS 3G 1,5 mm<sup>2</sup> for K3 - K2.

[Panel L, p. 13](#) shows how to connect the mains power cable to the amplifier.

**⚠ Make sure the AC mains voltage used is within the acceptable operating voltage range: 115V-230V ±10%. ⚠**

**⚠ It is important to connect the ground for safety, do not use adapters that disable the ground connection. ⚠**

**⚠ Connection to the mains shall be done only by a electrotechnical skilled person according the national requirements of the countries where the unit is sold. ⚠**



### 3:5. Precautions regarding installation

#### WARNING: TO PREVENT FIRE OR ELECTRIC SHOCK

- ▶ This device must be powered exclusively by earth connected mains sockets in electrical networks compliant to the IEC 364 or similar rules.
- ▶ Install K6, K8, K10 and K20 into rack cabinet.
- ▶ With K6, K8, K10 and K20 a sectioning breaker between the mains connections and the amplifier must be installed inside the rack cabinet. Suggested device is 32A/250VAC, C or D curve, 10kA.
- ▶ With K2 and K3 provide a sectioning breaker between the mains connections and the amplifier. Suggested device is 16A/250VAC, C or D curve, 10kA.
- ▶ Before powering this amplifier, verify that the correct voltage rating is being used.
- ▶ Verify that your mains connection is capable of satisfying the power ratings of the device.
- ▶ Do not use this amplifier if the electrical power cord is frayed or broken.
- ▶ Output terminals are hazardous: wiring connection to these terminals require installation by an instructed person and the use of ready-made leads.
- ▶ Take care to lock the output terminal before switching the device on.
- ▶ To avoid electrical shock, do not touch any exposed speaker wiring while the amplifier is operating.
- ▶ Do not spill water or other liquids into or on the amplifier.
- ▶ No naked flame sources such as lighted candles should be placed on the amplifier.
- ▶ Do not remove the cover. Failing to do so will expose you to potentially dangerous voltage.
- ▶ The manufacturer cannot be held responsible for damages caused to persons, things or data due to an improper or missing ground connection.
- ▶ Contact the authorized service center for ordinary and extraordinary maintenance.

**It is absolutely necessary to verify these fundamental requirement of safety and, in case of doubt, require an accurate check by qualified personnel.**

## Connections

Make sure the power switch is off before attempting to make any input or output connections.

By using good quality input and speaker cables, the likelihood of erratic signal behavior is reduced to a minimum. Whether you make them or buy them, look for good quality wires, connectors and soldering techniques.

### 4:1. Signal grounding

There is no ground switch or terminal on the K Series amplifiers. All shield terminals of input connections are directly connected to the chassis. This means that the unit's signal grounding system is automatic. In order to limit hum and/or interference entering the signal path, use balanced input connections.

In the interests of safety, the unit MUST always operate with electrical safety earth connected to the chassis via the dedicated wire in the 3-wire cable (ref. [§3:4.AC mains supply](#)). Never disconnect the ground pin on the AC mains power cord.

### 4:2. Analog audio input connections

Analog input is provided by means of Neutrik XLR female connectors (K2, K3), or XLR/jack hybrid combo connectors (K6, K8, K10, K20) one per channel input. Signal polarity of analog input connections is shown in [Panel H, p. 12](#).

### 4:3. Analog line output

Line out is provided in K2 and K3 via a couple of XLR connectors on the rear panel. In DSP equipped models, the output signal is pre-DSP, being a replica of the input signal. Signal polarity of line output connections is shown in [Panel H, p. 12](#).

### 4:4. Digital Input

On DSP equipped models, the XLR input for channel2 can switch to an AES3 digital input. The AES3/analog push-button located nearby the channel 2 XLR input connector toggles the XLR between analog and digital input.

In AES3 mode

- ▶ the channel 2 analog line out is off (K2, K3 only);
- ▶ the channel 1 analog input can be used as redundant input if the digital input fails.

The AES3 connection carries a channel pair through a 110  $\Omega$  nominal impedance wire in the form of a balanced (differential) digital signal: in AES3 XLR connectors the identification of hot and cold pins is not an issue. Avoid the use of microphone cables in AES connections: impedance mismatch can result in signal reflections and jitter, causing bit errors at the receiver.

## 4:5.AESOP

The AESOP connection can transport a single bidirectional Fast Ethernet (IEEE 802.3u, 100 Mbit/s) control data stream and two independent separate AES3 digital audio monodirectional streams using one Cat5 cable.

All K Series amplifier with the optional KAESOP board installed are equipped with at least two RJ45 connectors, each of them being a single AESOP port, capable of sending and/or receiving data and audio.

If the amplifier has only two RJ45 plugs, these will be on the front panel. If four plugs are present, the rear two will be “primary” ports, while the two on the front panel are “secondary” ports.

Primary ports allow both data and AES3 streams; secondary ports are data-only ports, allowing Ethernet connections only.

Cat5 standard twisted pair cables shall be used for connections up to 100 meters (328 ft). RJ45 pinout must comply to TIA/EIA-568-B and adopt the T568B scheme pinout, as show in [Panel J, p. 12](#).

For more details about networking and AESOP please refer to the Armonía Pro Audio Suite user guide.

## 4:6.Loudspeaker connections



**K6, K8, K10, K20**  
**CLASS3 WIRING**



**K2, K3**  
**CLASS2 WIRING**

**Output terminals are hazardous: wiring connection to these terminals require installation by an instructed person and the use of ready made leads.**

**Take care to secure the output terminal before switching the device on.**

Two Neutrik NL4MD speakON connectors are located on the rear panel, each of them being a single output to loudspeaker.

Pins 1+ and 2+ are physically bridged to the positive pole; pins 1– and 2– are physically bridged to the negative pole.

In order to remain within safe operating conditions, when using low impedance loads – i.e. 4 Ω or less (8 Ω or less in bridge mode) –, connections must be made with a four wire cable. Use suitable wire gauges to minimize power and damping factor losses in speaker cables.

### 4:6.1.Bridge-tied load

Bridge-tied load connection can be achieved as described in [Panel I, p. 12](#). In analog mode, only the input of channel 1 needs to be wired: link channel 2 to channel 1 by means of the link pushbutton located on the rear panel.

When operating with digital inputs – i.e. AES3 and AESOP – link the channels through Armonía Pro Audio Suite software: do not switch the link pushbutton.

## 4:7.V Ext

The V Ext terminal is used to remotely manage the DSP in K Series DSP amplifier and enable remote on/off.

K Series provided with a KAESOP board have a dedicated 2 pin Phoenix connector MCV 1,5/ 2-G-3,81 - 1803426 located near the rear Ethernet ports. K Series with the RS-485 serial port implement the V Ext connection on pin 2 (pin 7) of the RJ45 rear connector (ref. [Panel K, p. 12](#)).

When the V Ext port is powered by an external 12 V<sub>DC</sub> (1 A max) power supply, the internal controller allows to control the DSP – if present – even without AC mains supply, and allows serial communication – via RS-485 or ethernet communication in KAESOP equipped models – for remote on/off via the Armonía Pro Audio Suite software.

## 4:8.RS-485 connection

K Series amplifiers without an optional KAESOP board can be remotely controlled via an RS-485 connection.

Remote connection data cables must have an 8P8C modular plug – namely RJ45 plug – to be inserted in the rear port labelled “DATA PORT”.

By plugging an RJ45 plug and selecting the unit’s remote ID via the rotary trimmers, the amp is ready to be remotely controlled. Please note that ID number 00 is not allowed.

The recommended arrangement of the connections is a series of point-to-point (multidropped) nodes – i.e. a line or bus. Ideally, the two ends of the line should be terminated with a resistor, typically 120 Ω for twisted pairs. Powersoft recommends the use of Ethernet Cat5 straight through – *patch* – cables with pin/pair assignments TIA/EIA-568-B, i.e. T568B, as shown in [Panel J, p. 12](#).

## 4:9.Ethernet connections

K Series amplifier platforms can be remotely controlled via an Ethernet connection through a personal computer and Powersoft Armonía Pro Audio Suite software.

Powersoft recommends the use of Ethernet Cat5 straight through – *patch* – cables with pin/pair assignments TIA/EIA-568-B, i.e. T568B, as shown in [Panel J, p. 12](#).

# LEDs and display menu

# 5

In all K Series amplifiers, the combination of the front panel buttons together with the LCD display allow the user access to detailed information and complete control over the amplifier's status. Each button has multiple functions and the display shows the current active function for each button. This chapter illustrates all the functions and settings accessible via the amplifier front panel.








All the setup and settings functions described in this section can be also accessed through a computer with Powersoft's Armonía Pro Audio Suite software. Armonía is a software environment that offers an easy to use end user remote control interface and signal processing capabilities.

Armonía Pro Audio Suite is available for free on the Armonía forum:

Please note that when an Armonía client is connected to the amplifier, any local operation is overridden by the software.

## 5:1.LED chart

The LED columns on the front of the amp can work as output voltage or current meters. When the LED bars are set to meter output voltage, for example, the meters on the LCD screen will indicate output current values. The vice versa is true: LED bars set as output current meters, LCD display bars become output voltage meters.

| Color   | Solid   | Blinking                                |
|---|---|---|
|  | RED<br>Signal clipping<br>OR<br>channel muted<br>for protection <sup>1</sup>        | Tone<br>detection<br>problem            |
|  | YELLOW<br>Temperature<br>above 85°C<br>OR<br>output level <sup>2</sup> -2 dB        | Critical<br>temperature<br>(80° - 85°C) |
|  | GREEN<br>output level <sup>2</sup> -3 dB  |   |
|  | GREEN<br>output level <sup>2</sup> -6 dB  |   |
|  | GREEN<br>output level <sup>2</sup> -9 dB  |   |
|  | GREEN<br>output level <sup>2</sup> -15 dB   |   |
|  | GREEN<br>input signal is above<br>-60 dBV<br>OR<br>output level <sup>2</sup> -18 dB |   |

<sup>1</sup> In case of a short circuit protection event, the LCD screen will read "PROT".

<sup>2</sup> With respect to the output clipping threshold.

TAB. 1: LED chart.

## 5:2.Front display

When the amp is turned on, the main screen appears after a short presentation.

The first line of the screen will read "WAIT" while the system undergoes an initial batch of internal tests to determine the status of the amp. If all parameters are normal, "READY" will replace "WAIT" on the display.

System parameters are continuously monitored by the internal controller. If any parameter value should fall out of its correctly operating range, a code error relative to that particular parameter will appear on the third line of the LCD meter at the corresponding channel number. Should the parameter be out of range for both adjacent channels, the error code will appear in between the two compromised channels.

The fourth line of the front panel LCD screen shows the functions of the buttons immediately below. A beep confirms that a button has been pressed; please note that this sound is not mutable.

Pressing the button directly below the "menu" label on the LCD screen gives access to the amplifier's main menu. If an Armonía client is connected to the amplifier, a yellow shadow will appear in the software workspace view, signaling local access to the amplifier.

### 5:2.1.How to navigate the main menu

The K Series main menu can be accessed by pressing the first button on the right, underneath the LCD label "menu".

The up and down arrows allow to scroll the menu items. To access further menu voices branching off a specific menu item, select it and press the "menu" button once.

Some submenus in the K Series amps require the user to set a numerical value for specific parameters using the front panel buttons. In order to speed this process up, these submenus dedicate two of the four available buttons to switching to a fast or slow parameter increment mode.

When in the "slow" mode, the up and down arrows increase or decrease the parameter by a the smallest amount possible. The "fast" mode will increase or decrease the parameter value by an amount equal to 10 times the amount increased in the "slow" mode.

For example: in "slow" mode a single "+" button press will increase the Max mains current from 22 A to 23 A; in "fast" mode a single "+" button press will increase the Max mains current from 22 A to 32 A.

The overview of the structure of the Main menu and of the DSP settings menu are shown in [Panel M, p. 14](#) and [Panel N, p. 16](#) respectively.

# Settings

# 6

## 6:1. Amplifier settings: Input Gain/Sensitivity

All K Series amplifiers allow the selection of the input sensitivity. [TAB. 2](#) shows the input sensitivity values for the K Series amplifiers. These are the maximum RMS voltage values of a 1 kHz sine wave input before clipping occurs at the output stage. These values are reported with respect to the amplifier's gain.

The maximum balanced input signal before saturation of the input stage of the amplifier occurs with respect to the amplifier's gain is presented in [TAB. 3](#).

| Gain  | K2     | K3     | K6     | K8     | K10    | K20    |
|-------|--------|--------|--------|--------|--------|--------|
| 26 dB | 4.48 V | 5.30 V | 5.11 V | 5.50 V | 6.34 V | 7.37 V |
| 29 dB | 3.17 V | 3.75 V | 3.62 V | 3.90 V | 4.49 V | 5.22 V |
| 32 dB | 2.47 V | 2.66 V | 2.56 V | 2.75 V | 3.18 V | 3.68 V |
| 35 dB | 1.59 V | 1.88 V | 1.81 V | 1.95 V | 2.25 V | 2.62 V |

*TAB. 2: Input sensitivity (in RMS volt) @ 1 kHz vs gain.*

| Gain  | dBV  | dBu | V <sub>rms</sub> |
|-------|------|-----|------------------|
| 26 dB | 25.0 | 27  | 18               |
| 29 dB | 21.6 | 24  | 12               |
| 32 dB | 19.0 | 21  | 9                |
| 35 dB | 15.6 | 18  | 6                |

*TAB. 3: Maximum balanced input signal vs gain.*

## 6:2. Amplifier settings: Input select

K Series amplifiers allow the user to choose three different input modes (if available): Analog, AES3<sup>1</sup> and/or KAESOP<sup>2</sup>.

Each of these inputs can either be processed by the internal DSP (if installed) or not. The available signal routing path configurations are:

- ▶ Analog → Out  
Analog input and direct output
- ▶ Analog → DSP → Out<sup>1</sup>  
Analog input routed to the internal DSP
- ▶ AES3 → Out  
AES3 input, direct output
- ▶ AES3 → DSP → Out<sup>1</sup>  
AES3 input routed to the internal DSP
- ▶ KAESOP → Out<sup>2</sup>  
KAESOP input, direct output
- ▶ KAESOP → DSP → Out<sup>1,2</sup>  
KAESOP input routed to the internal DSP

<sup>1</sup> Available only with optional KDSP board

<sup>2</sup> Available only with optional KAESOP board

## 6:3. Amplifier settings: Max output voltage

The max output peak voltage of K Series amplifiers can be set by the user. It is possible to set output peak voltage levels for channel 1, channel 2 or both. Available voltage ranges for each model are shown in [TAB. 4](#).

| K2       | K3       | K6       | K8       | K10      | K20      |
|----------|----------|----------|----------|----------|----------|
| 40/140 V | 40/165 V | 40/153 V | 40/169 V | 40/200 V | 40/225 V |

*TAB. 4: Maximum output voltage (V<sub>peak</sub>).*

## 6:4. Amplifier settings: Max mains current

The maximum current the amplifier can draw from the mains can be set by the user through the front panel of all K Series amplifiers. Acceptable values are within the 8 A to 16 A for K2 and K3 and from 15 A to 32 A range for all other K amplifiers.

Setting the maximum mains current determines the current threshold at which a C-Type current breaker will trip.

## 6:5. Amplifier settings: Clip limiter CH1/CH2

The clip function can be used to prevent distortion caused by clipping of the output signal.

Please note that clip limiters can be set independently for both channels.

**CAUTION: disabling clip limiters can potentially damage loudspeakers.**

The amplifier's internal clip limiters should not be deactivated unless the limiting function is implemented by an external device such as digital system controllers. In this case, it is extremely important to correctly set limiting parameters in order to preserve loudspeakers from excessively powerful and potentially hazardous driving signals.

## 6:6. Amplifier settings: Gate CH1/CH2

This function allows to mute the amplifier channels individually if the input signal amplitude falls below the threshold shown in [TAB. 5](#).

Gating the output is delayed by 5 seconds after the input signal falls below the threshold. If the channel is muted, the bottom green LED in the corresponding front panel LED column is off.

| Gain  | dBV | dBu |
|-------|-----|-----|
| 26 dB | -54 | -52 |
| 29 dB | -57 | -55 |
| 32 dB | -60 | -58 |
| 35 dB | -63 | -61 |

*TAB. 5: Gate threshold vs gain.*

## 6:7. Amplifier settings: Mute at power on

This functions allows the user to automatically mute all channels when the amplifier is turned on. If this function is enabled, a "Muted" label will appear at the main screen next to each channel at the next power on.

## 6.8. Amplifier settings: Idle mode

The idle mode function is a power saving feature. When this function is activated, the output stage is turned off after no input signal greater than a selected threshold is detected for a user selectable amount of time, saving about 40 W of power per channel. This results in reduced heating, longer amplifier and fans life, and, especially for fixed installations which are permanently turned on, a lower electricity bill. Exiting from idle mode is quasi-instantaneous.

The timeout range goes from 0 to 720 minutes.

## 6.9. DSP Settings: Common settings

### 6.9.1. Source selection

This menu allows to choose the input signal to be processed by the DSP. The possible options are:

- ▶ **Stereo:** the signal coming from channel 1 is processed and routed out to output channel 1. Similarly, the input signal coming from Channel 2 is processed and then routed out to output channel 2.
- ▶ **Parallel from CH1:** the input signal from channel 1 feeds two parallel, distinct and independent processing branches. The result of one branch is sent to output channel 1, while the result of the other branch is sent to output channel 2.
- ▶ **Parallel from CH2:** the input signal from channel 2 feeds two parallel, distinct and independent processing branches. The result of one branch is sent to output channel 1, while the result of the other branch is sent to output channel 2.
- ▶ **Mono Mix:** the input signals from channel 1 and 2 are summed together and routed to both output channels in order to maintain a consistent output level.

### 6.9.2. AES3

This menu controls the AES3 input stream options. The AES3 source can enter the amplifier from the rear XLR connector or from the KAESOP board (if present) based on the type of input selection.

#### 6.9.2.1. Gain trim (dB)

This menu allows the user to set the gain to be applied to the signal coming from the AES3 digital input. Setting a 0 dB gain makes the full-scale digital signal equivalent to a 20 dBu analog input signal.

#### 6.9.2.2. If no link

This menu controls the amplifier's behavior should the AES3 signal connection fail or become unreliable. The AES3 connection is considered unreliable when transmission errors are greater than 1% of total data transmitted. The possible options are:

- ▶ **Mute:** when the AES3 connection fails, the amplifier mutes the output.
- ▶ **Analog:** when the AES3 connection fails, the amplifier will rely on the analog input as backup. This source

signal switching is done in real time in order to avoid any glitches in the audio feed. If the input levels are correctly matched between analog input and AES3 input (use the AES3 Gain trim parameter), the switch between AES3 and analog will be inaudible.

When using the analog input to backup a failed AES3 feed, the analog input connection must be setup based on source type of input AES3 stream:

- ▶ **AES3 from rear XLR** – the primary audio signal for this configuration is an AES3 fed via the rear XLR (AES3 → DSP → Out). The backup analog cable, with an analog signal identical to that provided by AES3, should be plugged in the channel 1 XLR input. If the AES3 feed should fail, the amplifier will automatically fall back to channel 1 analog input (we suggest to set the DSP source selection to “Parallel from CH1”). The signal levels of both primary AES3 and backup analog signals should be carefully matched. This can be done using the gain trim parameter or by adjusting the analog signal level.

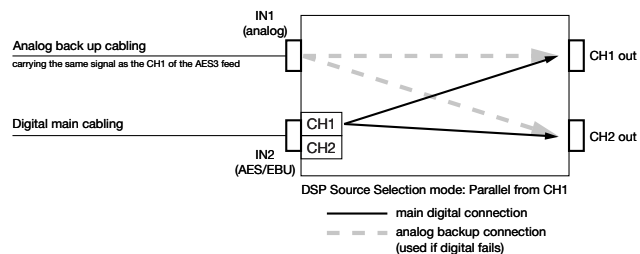


FIG. 2: AES3 from XLR.

- ▶ **AES3 from KASEOP** – the primary audio signal for this configuration is an AES3 fed via the RJ45 port (KAESOP → DSP → Out). The backup analog cable, with an analog signal identical to that provided by the KAESOP, should be plugged in the channel 1 XLR and channel 2 XLR (set to analog) connectors. The DSP's source selection can be set to any possible input. If the KAESOP feed should fail, the amplifier will automatically fall back to the analog input on the channels 1 and 2. The signal levels of both primary KAESOP and backup analog signals should be carefully matched. This can be done using the gain trim parameter or by adjusting the analog signal level.

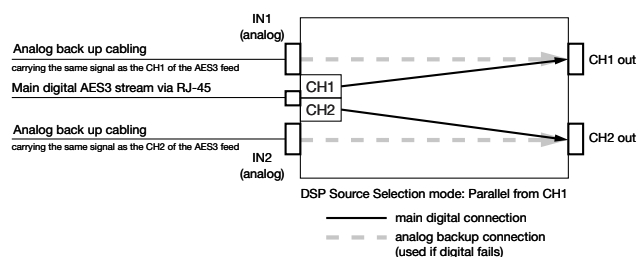


FIG. 3: AES3 from KAESOP.

When the AES3 stream is lost and the analog backup kicks in, a message on the front panel is displayed and if a remote client (e.g. Armonía) is connected to the amplifier, an alarm is sent to it.

### 6:9.3. Cross limit

In case of power limiting of only one channel (ref. §6:5. [Amplifier settings: Clip limiter CH1/CH2](#)), the gain reduction on one channel is mirrored to the other channel in order to maintain consistent signal levels. This is useful in two ways speakers where the limitation of one channel alone leads to an unbalanced sound. This function can be turned on or off.

### 6:9.4. Sound speed (m/s)

This menu allow the user to set the sound velocity used for time to distance conversions throughout the local interface. It can be set from 320 m/s to 360 m/s.

## 6:10. DSP Settings: Channel settings

All of the following settings are available for both channel 1 and channel 2. In all the following menus and submenus, the channel number whose properties are being edited is shown in the top right hand corner of the menu. If a specific parameter affects both channels, the top right hand corner will report this as "1+2".

### 6:10.1. EQs

This menu gives access to the parametric output equalizer interface. This menu lists the 16 parametric filters one by one. The current selected filter number is shown on the left of the first line. By pressing the up and down pointing arrows, it is possible to move from one filter to the next. The filter parameters are reported on the screen.

- ▶ **Active:** determines if the filter is enabled or not (flat response)
- ▶ **Gain(dB):** filter gain. Can be set only if the filter is a peaking or shelving filter. Acceptable values go from -15 to +15 dB in 0.1 dB steps.
- ▶ **Q factor:** quality factor of the filter. This can be set for all filters except shelving filters. Acceptable values range from 0.1 to 30 with 0.1 steps.
- ▶ **Bandwidth (oct):** the bandwidth of the filter expressed in octaves around the central frequency. This value is determined by setting the Q factor.
- ▶ **Type:** allows the user to select the filter type:
  1. Peaking
  2. Low Shelving (3 to 15dB/oct)
  3. High Shelving (3 to 15dB/oct)
  4. Low pass EQ
  5. High pass EQ
  6. Bandstop
  7. Bandpass
  8. Allpass

By pressing the "edit" button, the settings for the selected filter can be modified. [TAB. 6](#) summarizes which parameters can be edited according to the selected filter type.

|           | Frequency<br>20Hz-20kHz | Gain<br>±15 dB | Slope<br>3-15dB/oct | Q<br>0.1-30 |
|-----------|-------------------------|----------------|---------------------|-------------|
| Peaking   | ✓                       | ✓              |                     | ✓           |
| Lo-Shelv  | ✓                       | ✓              | ✓                   |             |
| Hi-Shelv  | ✓                       | ✓              | ✓                   |             |
| Lo-pass   | ✓                       |                |                     | ✓           |
| Hi-pass   | ✓                       |                |                     | ✓           |
| Band-stop | ✓                       |                |                     | ✓           |
| Band-pass | ✓                       | ✓              |                     | ✓           |
| All-pass  | ✓                       |                |                     | ✓           |

*TAB. 6: Filters parameters.*

### 6:10.2. Filters LP and HP

This menu allows the user to configure the crossover filters. There are 2 available crossover filters: a lowpass and a highpass. By combining both, the result will be a bandpass response.

Both traditional Infinite Impulse Response as well as brickwall linear phase Finite Impulse Response filters are implemented. If a FIR filter in the EQ section is enabled, a FIR crossover filter cannot be enabled at the same time. The low pass and high pass filters can be edited (active status, frequency, slope, filter type) by the user via the main LCD screen.

The classic IIR crossover filter shapes that can be selected as a high pass or low pass filter are: Butterworth, Bessel, and Linkwitz-Riley. In the first 2 cases, the frequency parameter in the edit window defines the -3 dB point, in the latter, the -6 dB point. The slope is freely selectable from a minimum of 6 dB/octave (1st order filter) to 48 dB/octave (8th order filter).

The FIR filters can be selected as normal (FIR Linear Phase) or enhanced (Hybrid FIR). The enhanced version of the filters gives a higher rejection of out of band signals, at the expense of a small phase modification (30°@400Hz). In both cases, the minimum working frequency is relative to the desired latency. Standard setting limit this to 400 Hz. For this reason it is advisable to use FIR filters to crossover upper midranges or mid-high drivers for which the phase coherency is a key point.

### 6:10.3. Polarity

This menu allows to reverse the signal polarity. The two selectable modes are:

- ▶ In phase: the signal's polarity is not altered
- ▶ Reversed: the signal's polarity is reversed.

### 6:10.4. Ch Delay (us)

This menu allows to set a single channel output delay.

This is helpful to time-align two different loudspeakers on the two output stages. The selectable delay varies from 0 to 32 ms (about 11 meters at 344 m/s sound speed), with a single sample step (equal to 1/96000th second or 10.4 us, about 3.5 mm).

### 6:10.5. Gain

This menu changes the channel gain, from -40 dB to +15 dB, with a 0.1 dB step.

## 6:10.6. Peak Limiter et Power Limiter

The limiting process in sound reinforcement is a way to protect loudspeakers from accidental damage; therefore, limiters are a safeguard against excessive signal peaks and/or signal power. They not only protect from sudden signal peaks but also they protect against to an over power delivering.

Bear in mind that limiting does not only prevent occasional damage, but it first and foremost guarantees a long component life. The two main purposes of limiting process are:

- ▶ **Limit over-excursion:** an impulsive signal can reach the speakers and cause damage due to over-excursion of the voice coil that is driven out of the magnetic gap. This can damage the diaphragm (breaking or deforming it).
- ▶ **Limit over-heating:** delivering high power to the voice coil may lead to overheating. This can damage the isolation or burn out the voice coil. Another evident high power driving effect is power compression, noticeable in low frequency speakers.

In order to prevent the mentioned phenomena two kinds of limiters are provided:

- ▶ **Peak limiter:** protects against mechanical damages. The peak limiter may also be used to control amplifier clipping. Designers should set this limiter's parameters as a function of both the maximum displacement ( $X_{max}$ ) of the diaphragm as well as the speaker's maximum tolerated voltage.
- ▶ **Power limiter:** protects speakers against thermal damage when excessive power is applied for extended periods of time, resulting in overheating and, eventually, burning. Designers should be aware of the maximum long term power safely applicable to speakers (AES power rating). An interesting approach to RMS limiting is one that uses coil temperature control. A complete knowledge of the driver's limits allows to keep the temperature level in a safe interval not only to avoid damage but to maintain the speaker in a "linear" zone that avoids power compression.

### 6:10.6.1. Peak Limiter

The peak limiter avoids potentially dangerous displacements of the cone (an excursion larger than allowed). It acts by reducing the amplifier gain in order to reduce the measured output peak voltage. To limit the dangers of dangerous very fast transient signals, all limiters implement a look ahead time of 0.5 ms.

As a rule of thumb, use the declared peak power or twice the program power as a loudspeaker safe-zone output power.

The peak limiter's setting do not change with the number of parallel speakers connected to the amplifier, this is because the same voltage is applied to all the components in a parallel circuit. When deciding parameters for a peak limiter of an amplifier with many loudspeakers connected to it in parallel, the peak power to be taken into consideration is that reaching only a single speaker.

You can refer to the following formulas:

$$P_{peak} = \frac{V_{peak}^2}{Re}$$

$$V_{peak} = \sqrt{Re \cdot P_{peak}}$$

Where  $Re$  is the nominal impedance of only one driver,  $P_{peak}$  is the peak power and  $V_{peak}$  is the peak output voltage.

A peak limiter, used with a very short attack time (i.e., with a very rapid onset), can also be useful in limiting the maximum peak voltage in distributed constant voltage lines.

Powersoft designed the K Series limiters as protective measures; therefore, they are not meant to "color" the sounds such as dynamic compressors can do. With this in mind, time constants for these limiters should be selected so as to limit potentially harmful phenomena which persist for no more than one or two periods of the related signal bandwidth.

[TAB. 7](#) gives a few examples of attack and release times with respect to the frequency range of the signal to be limited.

The peak limiter menu allows the user to define the following parameters:

- ▶ **Active:** toggles the power limiter's on/off status;
- ▶ **Threshold ( $V_{pk}$ ):** the peak voltage threshold at which the gain begins to be reduced;
- ▶ **Attack:** the attack time, i.e. the response time of the limiter intervention;
- ▶ **Release:** the decay time, i.e. the time constant after which the limiter's action is released and the gain restored to the nominal value.

In order to avoid choking the exceptional dynamic range offered by K Series amplifiers, the peak limiter is designed to ignore signal peaks lasting less than the attack time parameter. Moreover, the limiter has an additional lookahead buffer (0.5 ms) to soften clipping and minimize distortion, effectively yielding superior sonic performance.

When tweaking the peak limiter's levels, it is preferable to first setup the time parameters, and then adjust the threshold voltage. When editing the threshold value, the display shows the gain reduction (GR) in dB enforced by the limiter.

This information, together with the limiting voltage referred to the signal in the input amplifier stage (I) expressed in dBu, is displayed in real time to allow monitoring of the limiting actions as they are performed.

| Octave band (Hz) | Attack time (ms) | Release time (ms) | Atk/Rel ratio |
|------------------|------------------|-------------------|---------------|
| 63               | 45               | 720               | x16           |
| 125              | 16               | 256               | x16           |
| 250              | 8                | 128               | x8            |
| 500              | 4                | 32                | x8            |
| 1000             | 2                | 8                 | x4            |
| > 1000           | 1                | 2                 | x2            |

*TAB. 7: Attack and release times per octave bands.*

### 6:10.6.2. Power limiter

Given the low efficiency of electromechanical transducers, almost 50% of power reaching the voice coil is transformed into heat.

The power limiter is intended to avoid melting the voice coils of drivers while at the same time exploiting their maximum performance, therefore the power limiter should not be engaged at normal working levels. The power limiter acts by decreasing the amplifier's gain in order to reduce the power delivered to the load.

A correct power limiting is not an easy task and is multifaceted, based on a number of variable, like the knowledge of the component heat dissipation and the goals that must be achieved. Therefore may be difficult and a little bit empirical decide thresholds and constants time. Power limiters behavior base their operations on a mix based on threshold, dynamic behavior of the output readings (voltage and current) and the type of output readings monitored.

Check the gain reduction: in order to obtain the optimal sound it should not be greater than 2-4 dB even for the loudest piece of music. Please note that a common musical signal has very high peaks, but a rather small average level (high crest factor). A stationary tone has a much higher average power (e.g. a stationary sine wave has 3 dB crest factor) even if it "sounds" less loud to the human ear.

There are three main operating modes for the K Series power limiters.

- ▶ **TruePower™**: the amplifier's active output power is estimated by measuring the load current. The TruePower limiter is a Powersoft patent technology useful to avoid overheating of the voice coil; it can however also be used to avoid power compression. The DSP provides the measurement of the real power delivered (and then dissipated) to the coil, ignoring the apparent power handled by the line.

Empirical observation yields the following equation

$$P_{max} = \frac{P_{AES}}{3}$$

where  $P_{AES}$  is the declared AES power and  $P_{max}$  is the maximum power the speaker can dissipate "in real life".

If the  $P_{AES}$  is not available, the average or continuous power, known as  $P_{rms}$  can be used as well; however, it is important to proceed with caution in evaluating how the  $P_{rms}$  value is obtained. If no other values are declared, this rule of the thumb can be used: the  $P_{AES}$  can be estimated as 6 dB below the peak power ( $\frac{1}{4}$  of the peak power).

It is very important to note that, contrary to what happens with the peak limiter, setting the TruePower limiter parameters must take into account the number of speakers connected to the amplifier. This is due to the fact that the real power is calculated not only with the output voltage (which is identical for all speakers connected in parallel) but also with the output current (which changes according to the number of parallel speakers).

Determining the ideal time parameters for TruePower limiters is a very empirical process. As a guide, consider this simple rule: larger the coil, larger the thermal inertia, larger the time constant (ref. [TAB. 8](#)).

|      | Voice coil size (inches) | Threshold (W) | Attack time (ms) | Release time (ms) |
|------|--------------------------|---------------|------------------|-------------------|
| 1"   | tweeter                  | 10-20         | 100              | 300               |
| 1.5" | tweeter                  | 20-30         | 150              | 300               |
| 2"   | comp. driver             | 20-40         | 200              | 400               |
| 3"   | comp. driver             | 30-50         | 300              | 500               |
| 4"   | com. driver              | 40-60         | 500              | 3000              |
| 2"   | midrange                 | 30-100        | 500              | 3000              |
| 3"   | midbass                  | 50-150        | 1000             | 5000              |
| 4"   | woofer                   | 100-200       | 2000             | 5000              |
| 4"   | woofer                   | 150-250       | 4000             | 8000              |
| 6"   | woofer                   | 250-500       | 6000             | 10000             |

TAB. 8: Threshold and time parameters.

- ▶ **Power vs voltage @ 8 ohm**: the amplifier's output power is estimated by measuring the RMS value of the output voltage, assuming an 8 ohm load. This mode allows to create settings that work well for any number of speakers connected in parallel. For example, if a "power @ 8 ohm" limiter is set to limit the output power to 150 W, a single cabinet will be delivered a maximum of 150 W with 8 ohm load. Two speaker cabinets connected in parallel will be delivered a maximum of 300 W with 4 ohm load (8 ohm loads in parallel) and so on.

This limiter is a pure RMS limiter whose functioning is based solely on the voltage module measured at the amplifier output. Differently from the TruePower limiter, this limiter does not take into account the real part of the power; however, it has the advantage of being independent from the number of cabinets linked together, just as a peak limiter.

Some attention is needed to set the power threshold. The  $P_{AES}$  can be used if it is available. If no other power rating is declared, the  $P_{rms}$  can be used as well; however, the RMS parameter is a value related to the maximum manageable power and not the real power. Proceed with caution because the manageable power could be greater than the real power. Some constructors declare the RMS power at the minimum impedance point of the speaker; this, again, may lead to an overestimation of the true power values the speaker can handle. If no other values are available, the following rule of the thumb can be used: the  $P_{rms}$  can be estimated as 6 dB below the peak power ( $\frac{1}{4}$  of the peak power).

In order to preserve the driver in the long term, once the maximum power limit is decided upon, consider a power reduction of up to 3 dB of that value.

In order to use this limiter correctly, it is important to recalculate the equivalent power at 8 ohm. For example, with an 4 ohm speaker with 500 W maximum RMS power, the equivalent power at 8 ohm needs to be calculated as follow:

1. calculate the RMS voltage value needed to generate the maximum RMS power on the 4 ohm speaker:

$$V_{rms} = \sqrt{Re \cdot P_{rms}}$$

where  $V_{rms}$  is the RMS voltage of the speaker,  $P_{rms}$  is its average or continuous power and  $Re$  the nominal impedance. In the above example the RMS voltage of the 4 ohm speaker is  $V_{rms} = 44.7$  V.



2. calculate the power delivered to a speaker with nominal impedance of 8 ohm with that  $V_{rms}$  voltage:

$$P_{equiv} = \frac{V_{rms}^2}{8}$$

where  $P_{equiv}$  is the equivalent power on the 8 ohm speaker and  $V_{rms}$  is the RMS voltage value calculated at step 1. In this example (4 ohm speaker) this is 250 W. This is the threshold power to set in the limiter.

The time constants for the Power vs voltage @ 8 ohm limiter can be set in the same way as for the TruePower limiter.

- ▶ **Power vs current @ 8 ohm:** similar to the case power vs voltage @ 8 ohm, but based on the current measured at the output.

In this case the formula to derive the average or continuous power, known as  $P_{rms}$  from the RMS current is:

$$P_{rms} = I_{rms}^2 \cdot R_e$$

where  $I_{rms}$  is the RMS current.

This limiter is particularly useful in situations where the parameter to be controlled is the output current (e.g. for tweeters).

It is also useful for special applications such as large coil speakers with current controls. When determining this limiter's parameters, it is necessary to take into account the number of speakers connected in parallel to the amplifier.

The power limiter menu allows to set the following parameters:

- ▶ **Mode:** allows to determine the power limiter
  - ▶ OFF/ON: toggle the limiter on or off;
  - ▶ TruePower: sets the limiter mode to TruePower
  - ▶ Power vs V @ 8 Ω: sets the limiter mode to Power vs voltage @ 8 ohm
  - ▶ Power vs I @ 8 Ω: sets the limiter mode to Power vs current @ 8 ohm
- ▶ **Soft knee:** toggle ON/OFF
- ▶ **Thresh.(W):** threshold output power level expressed in watt at which the gain begins to be reduced;
- ▶ **Attack (ms):** the time it takes for the limiter to start reducing the amplifier gain once the output power has exceeded the threshold value;
- ▶ **Release (ms):** the time constant after which the gain is restored to its nominal value once the output power has returned below the threshold.

When editing the power threshold value, the display shows the gain reduction (GR) in dB enforced by the combined effect of the peak and power limiters. This information, together with the average power truly delivered to the load ( $P_{avg}$ ), is displayed in real time to allow monitoring of the limiting actions as they are performed.

## 6:10.7.Damping Control

This unique and patented feature allows to add a “virtual” series resistor to the amplifier output. This is done to obtain the desired damping factor with any cabling used. For this end, the virtual series resistor can also have a negative value to compensate cabling resistance.

For example, using a 10 meter cable to powering the subwoofer means adding a series parasitic resistance of about 0.3 ohm. By enabling the damping control, a virtual negative series resistance can be added to compensate the cable resistance.

**When damping control is enabled, a lowpass filter cutting around 400 Hz is automatically inserted into the amplifier chain. This feature is intended to be used only for subwoofer applications.**

Another advantage offered by the damping control feature is that in adding the series equivalent output resistance to the amplifier chain, the variation of the voice coil resistance due to heating can be taken into account. This allows to obtain a correctly damped bass response at average working condition, where the voice coils is subject to heating due to the passage of current.

For example, if the subwoofers are going to work at close to full power, an additional negative resistance of 1 to 2 ohm should be added to compensate the high resistance generated by the heated voice coils to obtain a correctly damped response. On the other hand, if the same subwoofers are working at low power, a smaller negative resistance should be added: in this case the cooler voice coil presents a smaller series resistance to be compensated.

Leaving too high an equivalent series resistance results in an overdamped system.

| Section area (mm <sup>2</sup> - AWG) | Nominal resistance | Length (m) | Resistance (ohm) |
|--------------------------------------|--------------------|------------|------------------|
| 2 x 1.5 - 16 AWG                     | R = 12 Ω/km        | 5          | 0,12             |
|                                      |                    | 10         | 0,24             |
|                                      |                    | 20         | 0,48             |
| 2 x 2.5 - 13 AWG                     | R = 7.4 Ω/km       | 5          | 0,07             |
|                                      |                    | 10         | 0,15             |
|                                      |                    | 20         | 0,30             |
| 2 x 4 - 11 AWG                       | R = 4.5 Ω/km       | 5          | 0,05             |
|                                      |                    | 10         | 0,09             |
|                                      |                    | 20         | 0,18             |

*TAB. 9: Typical speaker cabling resistance.*

On [TAB. 10](#) notice the exceptionally high value (3.8 ohm) when the driver reaches its thermal limit.

| Average power/ rated power | Power compression | Equivalent series resistance to a 8 Ω driver |
|----------------------------|-------------------|--|
| 10%                        | 1.4 dB            | 1.0 Ω  |
| 20%                        | 2.0 dB            | 1.4 Ω  |
| 50%                        | 2.8 dB            | 2.1 Ω  |
| 100%                       | 4.5 dB            | 3.8 Ω  |

*TAB. 10: Typical resistance increase due to voice coil heating.*

## 6:11.DSP Settings: Ch1 setup/Ch2 setup

### 6:11.1.Aux Dly (ms)

This delay is a further input delay: it acts before the input EQ and is independent from the input EQ stage.

### 6:11.2.Diagnostics

The diagnostics tool allows the user to program and test the integrity of the input and/or output line.

- ▶ The input test is based on the detection of a pure tone (generated by an external tone generator) on any input line.
- ▶ The output test relies on the measurement of the impedance at a well defined frequency: the amplifier can generate a pure tone and measure the voltage and current at the generated tone frequency. It is therefore possible to recalculate the impedance at that specific frequency.

When an alarm condition is met, the user can be informed of the event via software or directly from the amplifier.

#### 6:11.2.1.Tone in alarm

The tone in alarm can measure the integrity of any input line feeding signal into the amplifier. This detector can measure a tone applied by an external generator.

- ▷ **Tone in alarm:** enable/disable the input tone detection
- ▷ **Tone in freq:** the frequency of the tone that has to be detected (range 20 Hz - 24 kHz, step of 10 Hz).
- ▷ **Tone in Vmin:** the minimum threshold value that has been detected (range 0  $V_{rms}$  - 4  $V_{rms}$ , step of 10  $mV_{rms}$ ).
- ▷ **Tone in Vmax:** the maximum threshold value that has been detected (range 0  $V_{rms}$  - 4  $V_{rms}$ , step of 10  $mV_{rms}$ ).

#### 6:11.2.2.Tone out gen

The inner tone generator allows the user to generate a tone that can be used to check the integrity of the output line. This tone should be used outside of the frequency bandwidth of the driven speaker to avoid can be listen.

- ▷ **Tone out gen:** enable/disable the internal generator.
- ▷ **Tone out ampl:** the output voltage of the generator (range 0  $V_{rms}$  - 20  $V_{rms}$ , step of 1  $V_{rms}$ ).
- ▷ **Tone out freq:** the frequency of the tone that has to be generated and eventually detected (range 20 Hz - 24 kHz, step of 10 Hz).

#### 6:11.2.3.Tone out alarm

The output tone detection can measure the presence of a tone generated by an external or internal generator.

- ▷ **Tone out alarm:** enable/disable the output tone detection.
- ▷ **Tone out Vmin:** the minimum detected threshold voltage value (range 0  $V_{rms}$  - 20  $V_{rms}$ , step of 1  $V_{rms}$ ).
- ▷ **Tone out Vmax:** the maximum detected threshold voltage value (range 0  $V_{rms}$  - 20  $V_{rms}$ , step of 1  $V_{rms}$ ).

#### 6:11.2.4.Load Alarm

The output Load Monitor allows to detect the impedance load at a certain frequency. The high resolution algorithm implemented in this tool allows accurate measures.

- ▷ **Load alarm:** enable/disable the impedance detection.
- ▷ **Load Zmin:** the minimum allowed impedance threshold value (range 0  $\Omega$  - 500  $\Omega$ , step of 0.1  $\Omega$ ).
- ▷ **Load Zmax:** the maximum allowed impedance threshold value (range 0  $\Omega$  - 500  $\Omega$ , step of 0.1  $\Omega$ ).

#### 6:11.2.5.Measures

Pressing the button measures gives access to a sub menu where the various amplifier readings are available.

- ▷ **Tone in:** measurements of the input tone at the selected frequency.
- ▷ **Tone out:** measurements of the output tone at the selected frequency.
- ▷ **Z load:** measurements of the load at the selected frequency.

## 6:12.DSP Settings: Input EQ

This menu allows to turn on / turn off the input processing block. This can be useful when resetting the amplifier to the original "output processing only" behavior without using any software.

Turning off the Input EQ, all input processing set up using, for example, the Armonía Audio Suite can be bypassed at once.

It is advisable to save amplifier presets with this setting turned off: in this way when loading presets the user can be sure that only the output processing is enabled. The burden of re-enabling and setting up input processing is left to the remote control software.

## 6:13.DSP Settings: Reset input section

This operation disables the input processing (input EQ, input gain and delay) and resets the aux delay to zero.

## 6:14.DSP Settings: Reset output section

This function disables all output EQ, limiters and damping functions.

**Warning: this operation may potentially damage connected speakers.**

Pay special attention to shutting down any audio source before using this function.

# Networking

# 7

Network capabilities and network setting menus are available only for K Series amplifiers equipped with a KAESOP board.

KAESOP stands for K (as in Powersoft's K Series) AES3 and Ethernet Simple Open Protocol. Powersoft's KAESOP is designed to provide high reliability to live applications in harsh environments where Quality of Service must be guaranteed.

For more details about the AESOP configuration, refer to the Armonía Pro audio Suite user guide.

## 7:1.AESOP

### 7:1.1.Data stream

The data stream in the AESOP is implemented by a 100 Mbit Ethernet connectivity with auto-sense.

Each device can use a static IP address assigned by the user. Alternatively, it can be set to automatically configure itself without user intervention following the Zeroconf protocol.

The dual port design in K Series amplifiers allows for daisy chain and redundant ring topologies. A fault-bypass built-in feature takes into account the possibility of losing an intermediate device or having a faulty cable link without compromising the ring integrity.

The KAESOP board detects bad quality connections by counting errors on the Ethernet control. Faulty connections are automatically switched from 100 Mbit/s to 10 Mbit/s to attempt to keep the link active even in the worst case scenarios.

### 7:1.2.Audio

Audio is distributed to devices via the AESOP protocol by 2 independent and separate AES3 streams labeled AES3-A stream, AES3-B stream. These are carried by two Cat5 wire pairs unused in the 100 Mbit Ethernet protocol.

AES3 is a license free and well known standard guaranteeing low-latency, high reliability and excellent audio quality. A single AES3 stream can carry a stereo audio signal. The AESOP protocol can therefore handle four audio channels.

When a K Series amplifier is powered off or if it is unavailable, a passive high frequency relay circuit allows the audio signal to pass through, preserving the network chain connection integrity.

When the device is powered up, the internal circuits automatically select the most appropriate AES3 stream direction and bypass the relay, re-buffering actively the AES3 signal. The direction is maintained until errors are detected on the AES3 receiver circuit. When errors or link failure are detected, the direction is swapped, to build-up a new path for the audio. In a fraction of a second (no more than 50ms), some of the devices in a ring will swap to the other direction, restoring the audio streaming.

### 7:1.3.Ethernet internal switch

All control data streams in the KAESOP system are transported via an Ethernet protocol. Inside to all K Series amplifiers is an Ethernet switch connected to each RJ45.

This means that the bidirectional data stream can enter/exit one port and exit/enter any other port, either alongside AES3 streams or on its own.

Internal routing of Ethernet networking is automatic and not user controllable. An internal switch provides packet flooding block services in order to allow building networks with a ring topology.

### 7:1.4.Forwarding and repeater modes

Each K Series amplifier can be configured to handle the pair of AES3 streams embedded in the AESOP protocol in one of two basic network modes: repeater and forwarder.

These are true connection "building blocks"; it is therefore important to understand these two modes thoroughly before attempting to create or modify larger and more complex amplifier networks.

The following are definitions of the terms used in this section:

- ▶ **AES3-A stream:** AESOP digital audio stream A (two channels)
- ▶ **AES3-B stream:** AESOP digital audio stream B (two channels)
- ▶ **AES3-XLR stream:** AES3 digital audio stream via the rear panel XLR connector.
- ▶ **PORT 1, PORT 2:** primary RJ45 AESOP ports
- ▶ **PORT 3, PORT 4:** secondary RJ45 Ethernet ports

For more details about AESOP configuration, refer to the Armonía Pro audio Suite user guide.

## 7:2.Network settings

The Network settings menu become available when the KAESOP board is installed.

Many of the menus in this section require the user to select one functioning mode from a set of possible alternatives. These alternatives are all presented in a list. A black diamond shape next to a specific item in the list indicates that that is the selected option.

- ▶ **Device mode:** this parameter sets the amplifier mode with respect to the AES3 stream. Available options are:
  - ▷ Repeater (default); Forward to AES3-A;
  - ▷ Forward to AES3-B;
  - ▷ Forward to both.

Note: when an amplifier is in forward mode (either to AES3-A, AES3-B or both) the amplifier can only accept the AES signal coming from the AES3-XLR connector. AES3 streams incoming from any other RJ45 port are ignored.

- ▶ **Addressing Mode:** this parameter controls the IP addressing assignment strategy:
  - ▷ **Manual:** requires the user to set a valid static address and subnet mask (and, optionally, the default

gateway). The PC should be on the same subnet of the amplifier if no routers are present between the PC and amplifier.

- ▷ **Automatic:** lets the amplifier ask and obtain a network configuration from a DHCP server. Starting from power-on, the amplifier tries to obtain a valid IP address from a DHCP server. After a timeout of 30 seconds, if an IP address is not obtained, the amplifier takes an automatic private address in the range 169.254.x.y, but continues to search for a DHCP server. When the DHCP becomes available, the address is updated. If no DHCP server is available, the amplifier obtains an IP address by Automatic IP (local link addressing or ZeroConf).

The amplifier behavior complies with RFC 3927, guaranteeing the interoperability with any host PC supporting this standard.

- ▶ **Set address:** this menu allows to manually set the amplifier's IP address, subnet mask and default gateway.
- ▶ **Show net config:** this menu shows the current networking configuration, either set by the user via the "Set address" menu or obtained automatically if the automatic addressing mode is selected.
- ▶ **Audio**
  - ▷ **Source selection:** this menu allows the user to select the AES3 stream source to feed the output power stage. The AES3 signal can come from either: AES3-XLR, AES3-A or AES3-B.
  - ▷ **Source mode:** this menu allows to select the channel(s) contained the selected AES stream to be forwarded to the output power stage of the amplifier. The possibilities are: Parallel from L (the left channel from the selected AES3 stream is forwarded to both amplifier channels), Parallel from R (the right channel from the selected AES3 stream is forwarded to both amplifier channels), Stereo (the left channel from the selected AES3 stream goes to channel 1 or the amplifier; the right channel from the AES3 stream goes to the amplifier's channel 2).
  - ▷ **Gain trim:** this parameter trims the digital level of the AES3 stream. The gain trim scale goes from +5 dB to -40 dB with 0.5 dB steps with respect to 0 dB equivalent of +13.5 dBu. A 0 dBFS level in the AES3 stream corresponds to an absolute analog level of +18.5 dBu when a +5 dB gain trim level is applied.
  - ▷ **If no link:** this parameter allows the user to choose the behavior of the amplifier when the digital audio stream is missing and the "Input selection" is set as KAESOP → OUT (or KAESOP → DSP → OUT). The two possible alternatives are: Mute and Analog. In Analog mode the amplifier automatically switches to CH1/CH2 analog input if the digital stream is missing, returning to the digital stream in case this should become available again. This mode could be used to implement an analog backup connection for the digital stream.

## Display

# 8

The Display menu allows the user to monitor the system status and the performance.

### 8:1.Display: Output meters

The output meters screen shows important output signal information for the amplifier.

By pressing the right most front panel button, the screen view is toggled between information relative to channel 1, channel 2 or relative to the sum of channels 1 and 2.

The output power reported is a peak value reading taken every 200 ms. In the "C1+2" mode, the RMS voltage and power readings displayed are the average RMS voltage and peak power of each channel. The RMS current value, on the other hand, is the sum of each single channel's RMS current level.

The load impedance is indirectly inferred by a successive approximations. Time between single output impedance approximations depends on the output signal: the greater the amplitude of the signal, the shorter the time interval between measurements needed to approximate the output impedance, the faster the successive approximation method will converge to the true impedance value.

### 8:2.Display: Temperature

This screen displays the current amplifier temperature.

### 8:3.Display: Mains meters

This screen displays the updated mains RMS voltage and RMS current levels. Values are displayed in numbers and as progress bars.

The current and voltage levels displayed in this screen are approximate values: which serve the purpose of giving a general indication of the mains levels. Please refer to other sources (such as calibrated multimeters) for reliable and exact mains voltage and current measurements.

### 8:4.Display: Amplifier name

The Amplifier Name menu gives access to two menu branches: the "Display amp data" function and the "Edit amplifier name" menu.

When the "Display Amp data" function is activated, the main amplifier screen shows the amplifier name (20 characters, bold) blinking to a second screen showing the current selected preset name (40 characters). If the preset has been altered in any way, the displayed preset name will have a "Modified" prefix to indicate this.

The amplifier name can be assigned by entering the "Edit amplifier name" menu.

# Local presets

# 9

All K Series amplifiers have an on board memory capable of storing up to 50 presets.

An amplifier preset is a snapshot of the current amplifier status, including the basic amplifier settings and the KDSP board settings if a DSP board is present.

## 9:1.Local preset: Locked presets

When the “locked presets” function is active, a number of presets, determined by the “Locked bank size” menu, is not overwritable. This function’s status can be toggled on/off by entering the Lock code.

If a wrong code is entered, the system simply returns to the previous local presets menu.

## 9:2.Local preset: Locked bank size

This menu allows the user to set the number of locally stored presets that cannot be overwritten. Either all (50) or none (0) of the presets can be locked. After entering the correct lock code, select the number of presets to be write protected.

## 9:3.Local preset: Recall local preset

In order to recall one of the 50 locally stored presets, press ok when the “Recall local preset” line is highlighted.

Navigate forwards or backwards in the existing presets list: press the right most button labelled “ok” to load the desired preset. If a preset location is not used, it is labelled <empty>.

## 9:4.Local preset:Save local preset

### 9:4.1.Save to an empty slot

To save the current amplifier setup as a preset to the local memory, enter the “Save local preset” menu. Select an empty preset location, press “ok”, and define a proper name.

If no other preset has been loaded in the amplifier either via remote control or using a SmartCard, by default the current preset name will be “PRESET” followed by the selected memory slot name.

The preset name can be edited one character at a time.

### 9:4.2.Overwriting an existing preset

If the preset location is not empty, the amplifier will ask the user confirmation to overwrite the file.

Note that if you have already input a preset name, or if you have loaded a preset from local memory or a SmartCard, the name is used as starting point for a new save preset operation.

## 9:5.Local preset: Change lock code

In order to change the lock code used to activate the “Lock presets” function, the old user code must be entered.

If the entered code is incorrect, the system returns to the previous screen. There is no limit on the number of times that an incorrect lock code can be entered.

## 9:6.Local preset: Erase all presets

This function allows to erase all non write protected presets in the amplifier’s internal memory. After having selected this function’s submenu by pressing “ok”, a confirmation screen will appear.

Pressing “ok” will erase all non protected presets; when all non write protected presets have been erased, a screen confirming this will appear.

# Setup

# 10

## 10:1.Setup: Hardware info

---

This menu allows the user to access various information about the amplifier's hardware. The first screen shows the amplifier name followed by:

- ▶ **S/N:** serial number of the amplifier
- ▶ **Hw ID:** hardware ID, selectable via the rotary encoders on the back panel

Pressing the “more” button on the screen allows to cycle through a greater number of pages containing more information; the “back” button will bring the user back to the previous setup menu.

- ▶ **KFRNT:** front panel firmware version.
- ▶ **KCTRL:** controller firmware version number.
- ▶ **KDSP:** DSP board firmware version (available only for models with the optional DSP board).
- ▶ **KAESOP:** network board firmware version (available only for models with the optional KAESOP board).
- ▶ **Lifetime:** operating hours of the amplifier (by default any brand new amplifier has 50 operating hours spent during the factory burn-in and initialization process).

## 10:2.Setup: Hardware monitor

---

This menu allows the user to access information about the current amplifier system parameters. These are:

- ▶ **PWRBSCH1:** amplifier's power supply voltage for channel 1
- ▶ **PWRBSCH2:** amplifier's power supply voltage for channel 2

Pressing the “more” button on the screen allows to cycle through a greater number of pages containing more information; the “back” button will bring the user back to the previous setup menu.

- ▶ **VAUX:** internal auxiliary voltage.
- ▶ **+5VAN:** auxiliary analog voltage.
- ▶ **VEXT:** external remote control voltage.
- ▶ **VAUX:** indicates if the power supply auxiliary voltage is correct.
- ▶ **IGBTCONV:** indicates the DC/DC converter monitor status.
- ▶ **VBOOST:** internal post PFC voltage.
- ▶ **192KHZ:** system clock frequency status

## 10:3.Setup; LCD contrast

---

This screen allows the user to set the LCD display contrast using the “+” and “-” buttons.

## 10:4.Setup: Set the keylock code

---

In order to prevent the amplifier's settings from being altered by acting on the front panel commands, the “lock” function can be activated

To activate the lock function, keep pressed for more than 1 second the button corresponding to the lock label: all other buttons will be locked. Unlocking buttons is done in the same way, but an unlock code is required for security reasons.

In order to enter an unlock code for the amplifier, select the “Set keylock code” from the Setup menu. Please note that this screen can also be accessed by pressing the “unlock” button in the main screen when the amp is in locked key mode.

Using the two central buttons, chose and set an unlock code. Pressing the right most key (labelled “sel”) allows to select the desired digit.

## 10:5.Setup: Single channel muting

---

Muting of one channel at a time can be done via the “mute” function directly from the amplifier's front panel.

Pressing the button directly below the “mute” label can mute each channel individually; in this case, the on screen channel-specific parameters are replaced by the “muted” label. Unmuting the channels is done by pressing the “mute” button again.

## 11:1.Armonía Pro Audio Suite

**Armonía Pro Audio Suite™** has been specifically designed to be used with K Series amplifiers as an easy to use configuring interface that allows system setting and customization.

Armonía can be installed on a PC running Windows (XP SP3 and higher). Download Armonía Pro Audio Suite from the Armonía forum:

Communication between the software and the amplifier is established via an RS-485 or Ethernet connection, depending on the available ports on the units.

Armonía provides control and monitoring of a wide range of amplifier functions, such as attenuation, mute, internal temperature and voltage rail monitoring.

On K Series equipped with the KDSP board Armonía offers full control on all signal processing features, including input and output equalization, alignment delays, FIR filters and load impedance monitoring, etc.

Armonía is scalable: it allows control of a single Powersoft amplifier or a very large system containing many amplifiers. For large fixed or touring installations, Armonía gives the operator the ability to monitor and control all amplifiers in the system from a single location, regardless of the amplifiers' positions.

This software has been designed to accept software plug-ins to enable third-party product control.

### 11:1.1.Networking

Powersoft amplifiers can connect to a PC running Armonía in two ways: with an RS-485 serial connection or via Ethernet.

Systems employing both categories of amplifiers may use both methods simultaneously: an Ethernet network being implemented for some amplifiers, and RS-485 for the others (bear in mind that Ethernet is a faster communications protocol than serial RS-485).

The range of network topologies which can be used in wiring a real system varies between the two communications methods.

Ethernet provides a slightly greater degree of freedom, as standard IT network switches may be used to create multiple hub systems as well as a single hub and linear daisy-chaining. A looped Ethernet topology is also permissible, which will provide redundancy in the event of a network failure.

An amplifier system using an RS-485 network can either be daisy-chained throughout or use the Powersoft PowerHub as a local switch.

## 11:2.Third party software

The K Series provides plug-ins for different third party control software.

Developed for Powersoft by independent consultants specialized in systems integration designs, these plug-ins provide monitoring and control of K Series amplifiers when integrated in proprietary network environment, such as:

- ▶ **Q-Sys™**: it provides integrated monitoring and control of Powersoft K Series and Duecanali Series amplifiers through a QSC Q-Sys system.
- ▶ **Crestron® macros**: it provides integrated monitoring and control of Powersoft amplifiers through a Crestron control system. These macros allow you to expand the flexibility of Powersoft's products in audio video integrated Systems.
- ▶ **AMX® module**: it provides AV system integrators with an interface control solution to take full advantage of the performance and flexibility of Powersoft's products in fixed install applications.
- ▶ **MediaMatrix® NWare™**: it provides integrated monitoring and control of Powersoft K Series.

Powersoft's Armonía Pro Audio Suite™ software will be required for initial setup and management of the amplifiers.

Further information is available on the software section of Powersoft [website](#)

## SmartCard

# 12

K Series amplifiers implement a SmartCard reader in the front panel. The SmartCard – provided and initialized by Powersoft – is a tool meant for storing and sharing setup configurations and presets: up to 150 presets can be stored into a single card and easily shared among different amplifiers.

### 12:1.Firmware update

The SmartCard can be converted into firmware card – losing the storage capacity – allowing to update the internal firmware of the amplifier.

Since the firmware update procedure depends on the actual configuration of the amplifier, please refer to the technical note #03 “K Series Firmware Update Procedure” available in the download area of [Powersoft website](#)

### 12:2.Step-Up card

K Series amplifiers are based on a flexible architecture that has been developed to meet specific expansibility criteria: by means of a specific Step-Up smartcard it is possible to upgrade the performance of a K series amplifier at the cost, more or less, as the price difference between the various models.

The K6, K8 and K10 all share the same hardware platform. This means that by purchasing a K6, it is possible – as your business and your power requirements grow – to upgrade the platform’s output power.

For example, one Step-Up will transform the K6 into a K8, two Step-Ups will make the K6 a K10. Of course the K8 can also be upgraded.

The K2 and K3 on the other hand, are based on a smaller hardware, so it is possible to Step-Up from K2 to K3, but not from K3 to K6.

Same goes for the K20, which is also based on a different hardware, making the K10 the highest possible upgrade currently available.

The step-up procedure is described in the technical note #04 “K Series Step-up Procedure” available in down-load area in [Powersoft website](#).

**Step-Up card as well as the storage and firmware smartcard can be requested to Powersoft dealers.**

## Warranty and assistance

# 13

### 13:1.Warranty

#### 13:1.1.Product warranty

Powersoft guarantees its manufactured products to be free from defective components and factory workmanship for a period of 48 (forty eight) months, starting from the date of purchase printed on Powersoft’s (or any of its Authorized Dealer’s) invoice to the end customer. All warranty repairs and retrofits must be performed at Powersoft facilities or at an Authorized Service Center at no cost for the purchaser. Warranty exclusion: Powersoft’s warranty does not cover product malfunctioning or failure caused by: misuse, abuse, repair work or alterations performed by non-authorized personnel, incorrect connections, exposure to harsh weather conditions, mechanical damages (including shipping accidents), and normal wear and tear. Powersoft will perform warranty services provided that the product is not damaged during transportation.

#### 13:1.2.Return of Goods

Goods can be returned to Powersoft only after they have been granted a Return Merchandise Authorization (RMA) number to be attached to the external packaging. Powersoft (or its Authorized Service Center) has the right to refuse any returned good without a RMA number.

#### 13:1.3.Repair or replacement

Powersoft reserves the right to repair or replace any defective goods covered by product warranty at its sole discretion and as it deems best.

#### 13:1.4.Cost and responsibility of transport

The purchaser (or end user/customer) is solely responsible for all transportation costs and risks associated with sending warranty covered goods to Powersoft or its Authorized Service Center. Powersoft will assume full responsibility and cover all costs incurred to send the goods back to the purchaser (or end user/customer).

### 13:2.Assistance

There are no user-serviceable parts in your amplifier. Refer servicing to qualified technical personnel. In addition to having an in-house service department, Powersoft supports a network of authorized service centers. If your amplifier needs repair, contact your Powersoft dealer (or distributor). You can also contact the Powersoft Technical Service department to obtain the location of the nearest authorized service center.

Even though most product malfunctioning can be solved at your premises through Powersoft Customer Care or your direct knowledge, occasionally, due the nature of the



failure, it might be necessary to return defective products to Powersoft for repair. In the latter case, before shipping, you are kindly asked to follow step by step the procedure described below:

- ▶ Obtain the “Defect Report Form” by contacting our Customer Care Department via email: or download the “[Defect Report Form](#)” from Powersoft’s website ().
  
- ▶ Fill out one “Defect Report form” for each returned item (the form is an editable tab guided document) and save as your name, amp model and serial Number (for example: `distributornamek10sn17345.doc`) providing all required information except the RMA code/s and [send it to for Powersoft approval](#).
- ▶ In case of defect reports approved by the Powersoft Customer Service Representative you will receive an RMA authorization code (one RMA code for each returning device).
- ▶ Upon receiving the RMA code you must package the unit and attach the RMA code outside the pack, protected in a waterproof transparent envelope so it is clearly visible.

All returning items must be shipped to the following address:

Powersoft  
Via Enrico Conti, 13-15  
50018 Scandicci (FI) Italy