



KH2
USER GUIDE
English

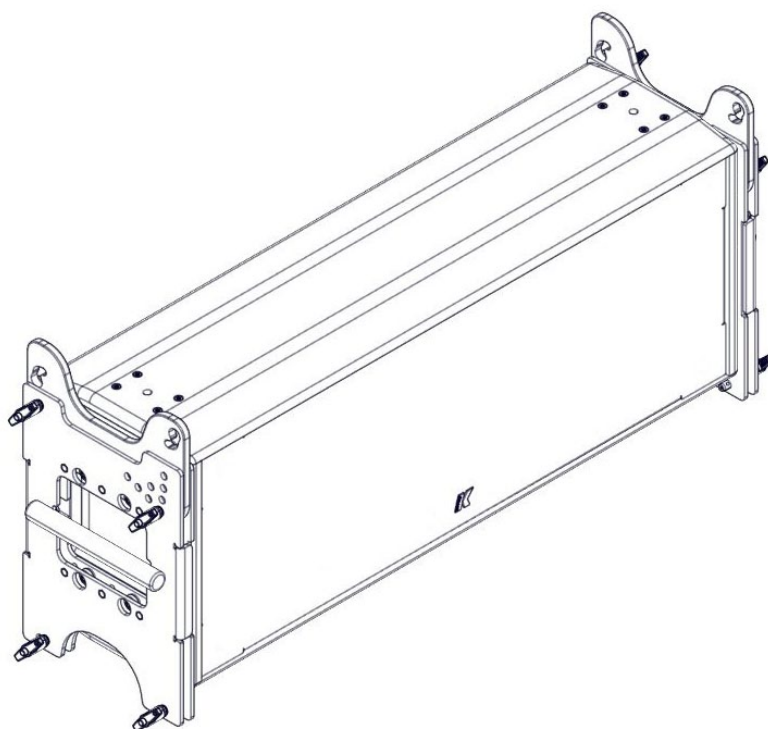


TABLE OF CONTENTS

SYMBOLS	3
1. INTRODUCTION	4
2. KEY FEATURES	4
3. APPLICATIONS.....	4
5. UNPACKING	7
6. PRODUCT OVERVIEW.....	8
7. AMPLIFIER	9
7.1 AC POWER	9
7.2 VOLTAGE REQUIREMENTS.....	9
7.3 CURRENT REQUIREMENTS.....	9
7.4 PROTECTION CIRCUITRY	10
7.5 REAR PANEL	10
7.6 RS485 NETWORK	12
8. TOUCH SCREEN FUNCTIONS	13
9. DIGITAL STEERING - EASE FOCUS	15
10. REMOTE CONTROL - K-FRAMEWORK	15
11. RIGGING	15
12. SERVICE	16
13. TECHNICAL SPECIFICATIONS	17

SYMBOLS



K-array declares that this device is in compliance with applicable CE standards and regulations. Before putting the device into operation, please observe the respective country-specific regulations!



Waste Electrical and Electronic Equipment (WEEE)
Please dispose of this product at the end of its operational lifetime by bringing it to your local collection point or recycling center for such equipment.



This symbol alerts the user to the presence of recommendations about the product's use and maintenance.



Warning: DANGEROUS VOLTAGE.
Terminals marked with this symbol carry a risk of **electric shock**, therefore external wiring connected to these terminals requires installation by a qualified professional or the use of ready-made leads or cords.



This symbol alerts the user to the presence of recommendations about product's use and maintenance.



This device complies with the Restriction of Hazardous Substances Directive.

1. INTRODUCTION

Research conducted over 10 years which was used to develop the next generation of touring systems, the Firenze Series, has also been applied to the new line of K-array speakers, the Concert Series.

This groundwork led to significant advancements including the ability to digitally steer the sound, the use of an onboard touch screen and an intelligent integration of capabilities such as various stacking and hanging positions, weather resistance and integrated DSP multiple analog and digital inputs. The company's signature compact design, Slim Array Technology, is also implemented.

The KH2 is the smallest mid-hi line array element offered in the line. The self-powered speaker is comprised of two 8" Neodymium magnet woofers each with a 2.5" voice coil and two 1.4" compression drivers with a 2.5" voice coil each. However small in size, this compact speaker can really deliver a large sound, making it a perfect solution for medium scale events in stadiums, arenas, concert halls and theatres.

2. KEY FEATURES

- Unique performance-to-size ratio
- Self-powered
- Integrated DSP with multiple analog and digital inputs
- Onboard touch screen with matrix control
- Wide horizontal coverage
- Digital acoustic steering system
- RS485 and USB connectivity for remote control

3. APPLICATIONS

- Large-scale events
- Touring sound reinforcement
- Theatres, stadiums, concert halls, arenas
- Houses of worship
- Portable and installed AV systems

4. SAFETY INFORMATION

Read these instructions - Keep these instructions - Heed all warnings



Warning. Failure to follow these safety instructions could result in fire, shock or other injury or damage to the device or other property.



This symbol alerts the user to the presence of recommendations about the product's use and maintenance.



The lighting flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of not isolated, dangerous voltage within the product enclosure that may be of magnitude to constitute a risk of electrical shock.

IMPORTANT SAFETY INSTRUCTIONS

- Read these instructions.
- Keep this instructions.
- Heed all warnings.
- Follow all instructions.
- Do not use this apparatus near water.
- Clean only with dry cloth.
- Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- 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.
- Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
- Only use attachments/accessories specified by the manufacturer.
- 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.

- Unplug this apparatus during lightning storms or when unused for long periods of time.
- 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.

**WARNING**

- Since the device is a CLASS I apparatus, it must be only connected to an AC **three-wire grounding outlet**. If your outlet isn't grounded, contact a licensed electrician to replace it with a property grounded outlet.
- To reduce the **risk of electric shock**, unplug the AC mains connector before installing audio cable. Reconnect the power cord only after making all signal connections. Do not use the product if the power cord is broken or frayed. Protect the power cord from being walked upon or pinched.
- To completely disconnect this apparatus from the AC mains, disconnect the power supply cord plug from the AC receptacle.
- **Avoiding hearing damage.** Professional loudspeakers are capable of producing extremely high sound levels and should be used carefully. Never stand close to loudspeakers driven at high volume. Set the volume to a safe level. You can adapt over time to a higher volume of sound that may sound normal but can be damaging to your hearing. Hearing loss get worse every time you're exposed to a sound level of 90 dB or over for an extended period of time. If you experience ringing in your ears or muffled speech, stop listening and have your hearing checked. The louder the volume, the less time is required before your hearing could be affected.
- **Voltage requirement.** Make sure that the supplied voltage stays within the specified range. Verify that your mains connection satisfies the power ratings of the device.
- Only connect the power supply to an appropriate power outlet
- Do not install the amplifier in wet or humid locations without using weather protection.
- TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, do not expose this apparatus to rain or moisture and objects filled with liquids, such as vases, should not be placed on this apparatus.
- The main plug of the power supply cord shall remain readily accessible.

**CAUTION**

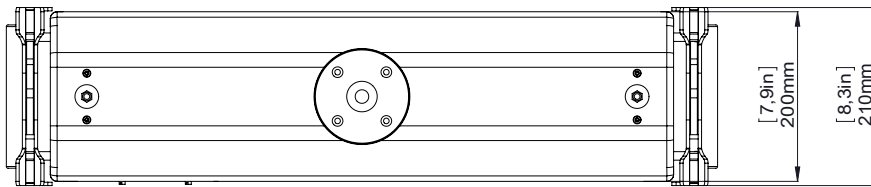
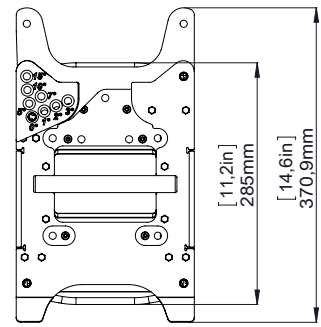
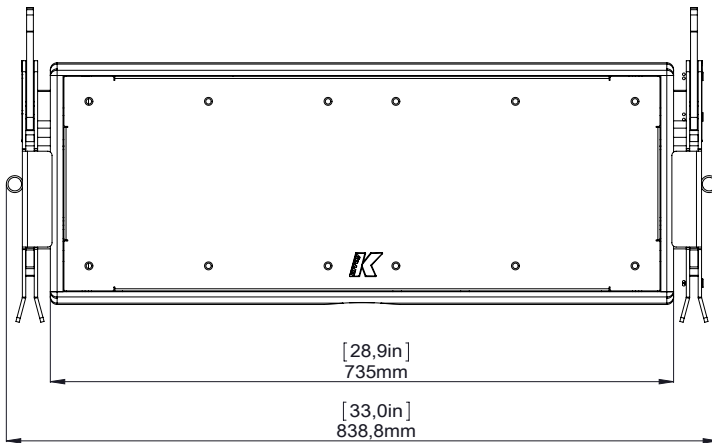
- **Choking Hazards.** This device contains small parts, which may present a choking hazard to small children. Keep the device and its accessories away from small children.
- It is important that loudspeaker systems are used in a safe manner.
- **Do not make repairs yourself.** Caution, risk of electric shock. Do not open the device, it contains potentially hazardous voltage. Never attempt to disassemble, repair or modify the system yourself. Disassembling the unit may cause damage that is not covered under the warranty. The device contains no user-serviceable parts. **Repairs should only be performed by factory trained service personnel.** Do not plug the power cord in if you suspect that your device needs service or repair.
- **Sound distortion.** Do not operate speakers for an extended period of time with sound distortion. This is an indication of malfunction, which in turn can generate heat and result in a fire.
- **Cooling.** During the use, it is normal for the device to get warm. The exterior of the device functions as a cooling surface that transfers heat from inside the unit to the cooler air outside. The device should be placed so that its location does not interfere with its proper cooling. For example, the device shouldn't be placed next to surfaces that can interfere with the properly cooling of the rear panel's radiators. When operating, the device should not be cover with additional protections.

- **Temperature.** Operate the device in a place where the temperature is between -20°C and 35°C (-4°F to 95° F). Avoid dramatic changes in temperature or humidity when using it, as condensation may form on or within the device.
- Take care not to spill any food or liquid through the device's grill. Do not attempt to dry the device with an external heat source, such as a hair dryer.
- **Carrying, handling and installing the device.** The device contains sensitive components. Do not drop, disassemble, open, crush, bend, deform, puncture, shred, incinerate, paint, or insert foreign objects into it. If your device has been dropped or damaged unplug the power cable immediately.
- **Set up.** Set up your device on a stable retaining horizontal surface. If combined or mechanically connected with other products, always verify the stability of the resulted system. Install the unit only in a location that can structurally support the weight of the unit, far away from people who can interfere with the stability of the system. In case of outdoor installation, protect the device from rain and moisture. Assure that the wind does not interfere with the system's stability, taking extra securities like chains, weights, ropes or any other certified anchoring systems. Doing otherwise may result in the unit falling down, causing personal injury or property damage or even death. The system should only be suspended by qualified personnel following safe rigging practices. Secure fixings to the building structure are vital. To clarify any doubt you may have, seek help from architects, structural engineers or other specialists.
- This audio system is not intended for use in the operation of nuclear facilities, aircraft navigation or communication systems, air traffic control systems, or for any other uses where the failure of the audio system could lead to death, personal injury, or sever environmental damage.

5. UNPACKING

Each K-array speaker is built to the highest standard and thoroughly inspected before leaving the factory. Upon arrival, carefully inspect the shipping carton, then examine and test your new product. If you find any damage, immediately notify the shipping company. Only the consignee may file a claim regarding the system's electronic equipment.

6. PRODUCT OVERVIEW



Weight
29.0 kg (63.9 lbs)
Connecting hardware included

7. AMPLIFIER

7.1 AC POWER

The amplifier module and any audio equipment connected to it (mixing consoles, processors, etc.) must be properly connected to the AC power distribution, preserving the AC line polarity. Every grounding point must be connected to a single node or common point using the same cable gauge as the neutral and line cable. Bad grounding connections between speakers and the rest of the equipment may produce noise, hum or serious damage to the input/output in the system's electronic equipment.



Before applying AC to any K-array self-powered speaker, ensure that the voltage potential difference between neutral and earth ground is less than 5 VAC.



7.2 VOLTAGE REQUIREMENTS

The auto-range power supply feature allows the unit to operate safely and without audio discontinuity when the AC voltage stays within a nominal range of 100 - 240 V (operating range 85 - 265 V) at 50 to 60 Hz. Please verify that your AC mains power connections are capable of satisfying the power rating for the device.



CAUTION. Do not connect the system to the AC mains power exceeding 265 V. Doing so will cause significant damage to the device and create serious risk for users!



7.3 CURRENT REQUIREMENTS

The amplifier presents a dynamic load to the AC mains power, drawing additional current as operating levels increase. Different cables and circuit breakers heat up at varying rates, so it is essential to understand current ratings and how they correspond to the circuit breaker and cable specifications. Maximum continuous RMS current - measured over a period of at least ten seconds - is used to calculate the temperature increase in cables which drives the proper size, gauge cable and rating for slow-reacting thermal breakers. Maximum burst RMS current - measured over a period of approximately one second - is used to select the rating for fast-reacting magnetic breakers.

For best performance, voltage drops should not exceed 10% at 100 V or 10% at 230 V. The minimum electrical service amperage required by a K-array loudspeaker system is the sum of its maximum continuous RMS current. K-array recommends allowing an additional 30% above the minimum amperage to prevent peak voltage drops at the service entry.

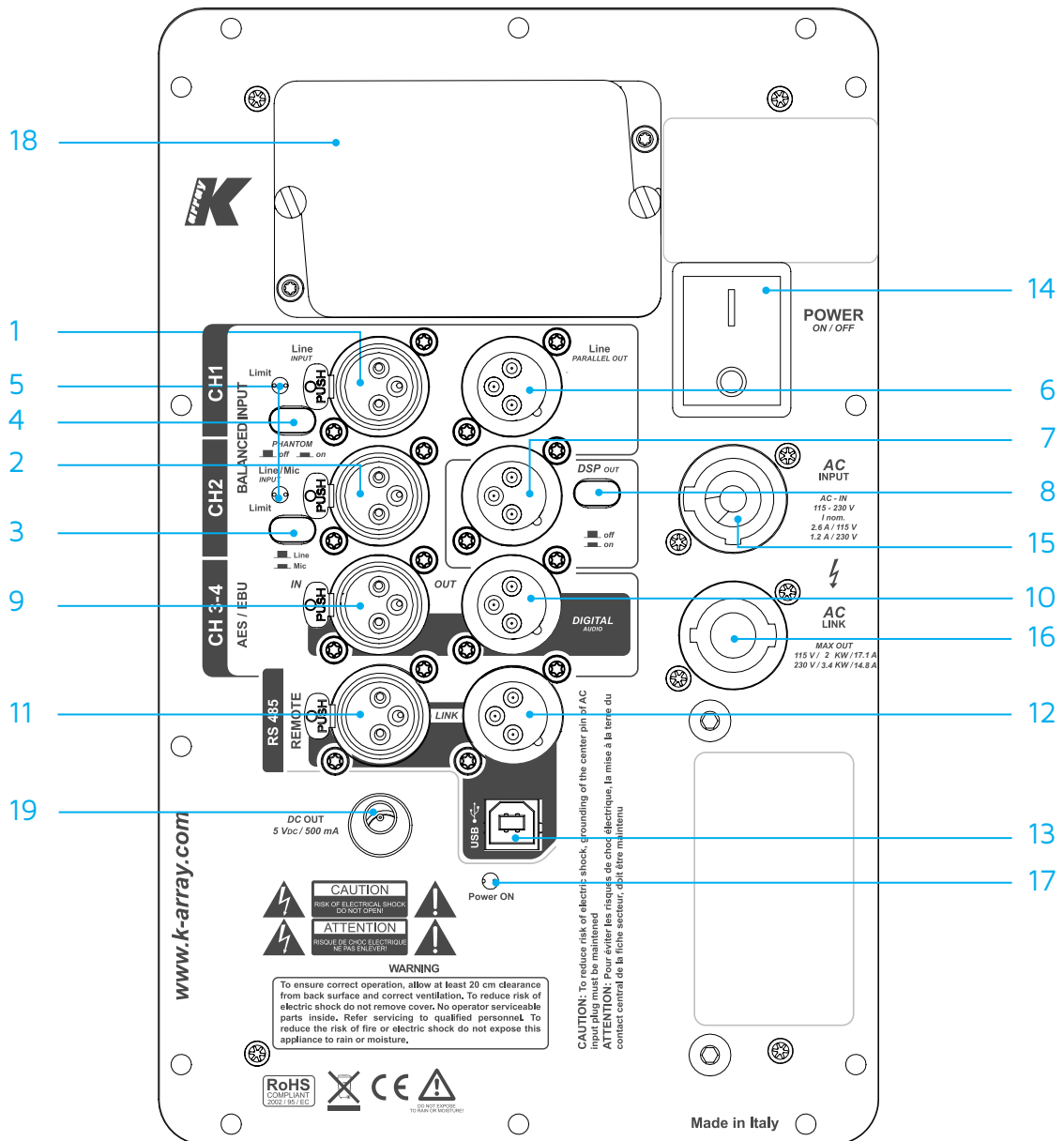
7.4 PROTECTION CIRCUITRY

Both the power supply and the amplifier sections are equipped with several protection circuits. Power supply protections aim to isolate a faulty section in electrical power system from the rest of the device in order to prevent the propagation of the fault and limit device damages. They comprise overcurrent, overvoltage and thermal protections.

Amplifier protections are triggered by audio signal current, voltage – by comparing input and output – and NTC (Negative Temperature Coefficient) thermistors. A Peak Current Shut Down and a Temperature Protection Limiter protect the output stage.

High frequency stationary signals, like steady sinusoidal signals – improperly referred to as continuous or permanent signals – with high amplitude tend to stress the amplifier section of the modules as well as the loudspeakers’ voice coils. When a high frequency stationary loud signal is fed into the amplifier, a dedicated Limiter confines its mean current depending on its level and frequency.

7.5 REAR PANEL

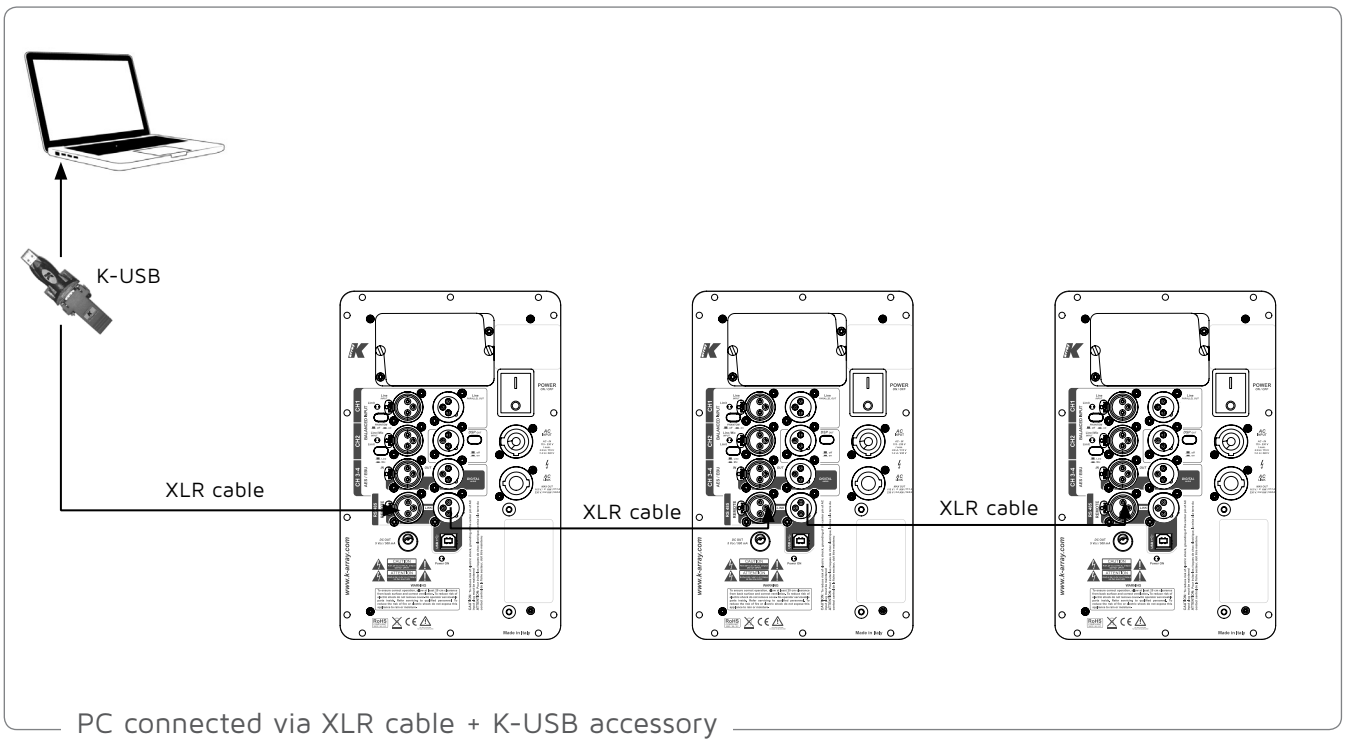
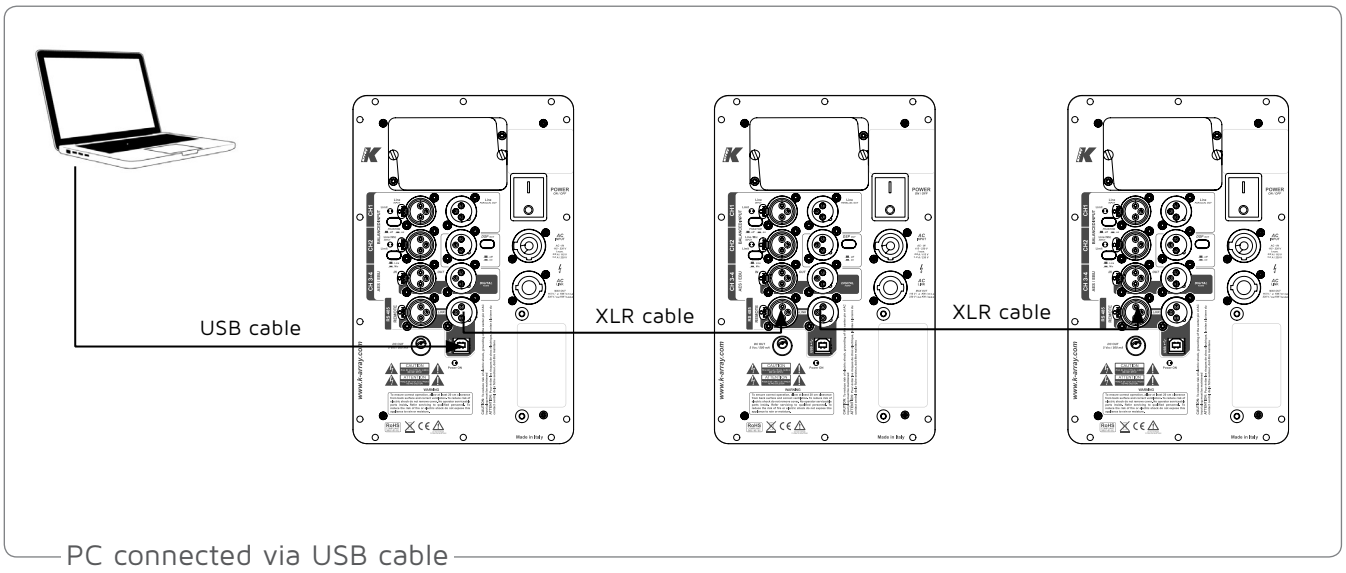


- 1) CH1 Line Input. XLR line level input with +4 dBu sensitivity.
- 2) CH2 Mic/Line Input. XLR input with selectable sensitivity for Mic (-30 dBu) or Line (+4 dBu).
- 3) Mic/Line Switch. Selects CH2 input sensitivity for Mic (-30 dBu) or Line (+4 dBu) level.
- 4) Phantom Power Switch. Turns phantom power (48V) on/off on CH2 input.
- 5) Limiting LEDs. Independent LEDs for the CH1 and CH2 inputs, which blink when the optical limiter engages to protect the corresponding pre-amp circuit. Limiter threshold is +5 dBu.
- 6) CH1 Parallel Line Out. XLR parallel output providing a direct signal from the CH1 Line Input. This output cannot be processed or controlled via the K-Framework software.
- 7) DSP Out. When the DSP Out switch is not pressed (off), this connector provides a direct signal from the CH2 input. At the moment this connector doesn't output any signal if the DSP Out switch is pressed (on). This function will be useful for future applications.
- 8) DSP Out Switch. See point 7.
- 9) AES/EBU Digital Input. XLR input connector for two-channel AES/EBU digital audio, accepting sample rates up to 96 kHz.
- 10) AES/EBU Digital Output. XLR output, providing two-channel digital audio from AES/EBU Digital input with no latency.
- 11) REMOTE RS485 Link Input. XLR input for connecting the KMT from another RS485 device in a K-Framework network. RS485 Link Input can also be used to connect a computer running the K-Framework software (requires K-USB USB-to-RS485 adapter).
- 12) REMOTE RS485 Link Output. XLR output for connecting additional RS485 devices in a K-Framework network.
- 13) REMOTE USB Input. Connects a computer running the K-Framework software for remote control of the device. Users can manage an entire network of RS485 devices with one PC connected via USB.
- 14) Power switch. Turns the device on and off.
- 15) AC Input. PowerCon input for AC power. See p. 11 for voltage and power requirements.
- 16) AC Link. PowerCon output for feeding AC mains power to additional K-array components with a PowerCon AC input socket.
- 17) Power On LED. Indicates the system is ON.
- 18) TOUCH SCREEN Control panel. Provides access to the main functions of the DSP on board (see Section 8.)
- 19) 5 Volt Power Connector. Provides 5VDC/500mA to power accessories.

7.6 RS485 NETWORK

The RS485 Link Input and RS485 Link Output on the rear panel allow users to create a network of K-array devices which are manageable through the K-Framework software on a PC (see *K-Framework User Guide* downloadable from the [K-array web site](#)). All devices can be linked with standard XLR cables.

The PC can be connected to the network either with USB cable or XLR cable (requires K-USB USB-to-RS485 adapter accessory) as shown in the diagrams below.




8. TOUCH SCREEN FUNCTIONS

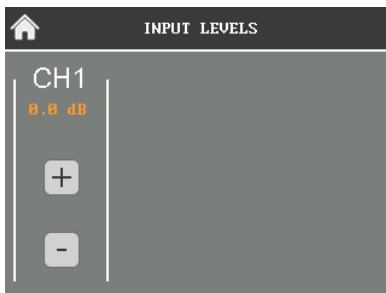
The main functions of the onboard DSP can be managed with the integrated touch screen. Functions are grouped into six sections, shown as icons on the Home page.

HOME PAGE



 To reach the Home page from any of the pages, touch the *Home* button.

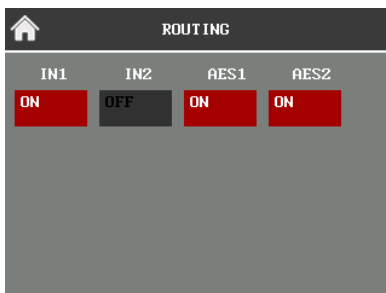
LEVELS



The Levels page allows users to manage the amplitude of the input signal (whether analog or digital).

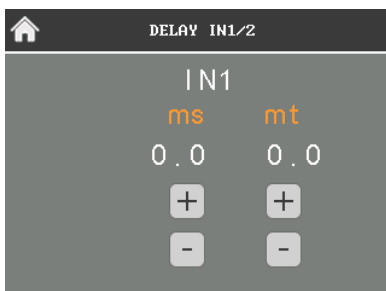
If you have a cluster composed of more than one unit, we recommend setting the same input levels on all units.

MATRIX



The Matrix page allows users to switch on/off the four inputs channels independently. *IN1* and *IN2* are the two analog inputs, *AES1* and *AES2* are the two channels of the AES/EBU digital input.

DELAY



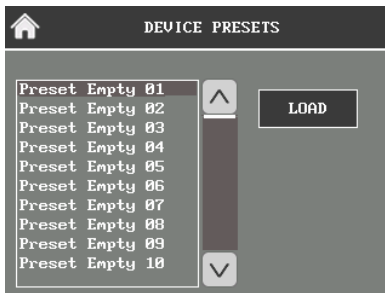
The Delay page allows users to delay the audio signal sent to the unit. Users can set the delay in milliseconds (ms) or meters (mt).

LED



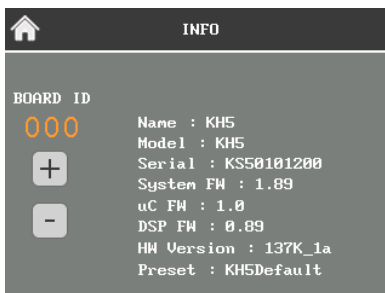
On the Home page click on *LED* to switch on/off the LED situated at the front of the unit.

PRESET



The Preset page allows users to load presets stored on-board.

INFO



The Info page contains information about the current software and firmware, the current preset loaded and the *Board ID* of the device.

The *Board ID* is a number which identifies the device when it is connected in a K-framework network (see Paragraph 7.6). Make sure that each device in the network has a different ID number.

9. DIGITAL STEERING - EASE FOCUS

Acoustic steering is a technique that allows you to steer a speaker's sound beam through the interaction of several loudspeakers. The full potential of this technique can truly be maximized only when there is a system that allows you to precisely and independently control each element of the array. A powerful software that can optimize all the parameters in order to obtain the desired acoustic result is required.

The KH2 features this capability and each unit has an onboard DSP designed to load FIR filters to achieve the best and the most accurate steering results. FIR coefficients can be easily calculated with EASE Focus, the industry's most accurate acoustic simulation software. Based on input data describing location geometry and sound sources, the software computes optimal filter transfer functions that can be automatically converted to FIR filters.

EASE Focus software and its user guide can be downloaded from the AFMG website: focus.afmg.eu

10. REMOTE CONTROL - K-FRAMEWORK

All DSP functions, including system EQ, delay and loading of FIR filters calculated with EASE Focus, can be controlled using the K-framework software.

The K-framework software and its user guide can be downloaded from our website at http://www.k-array.com/software_download

11. RIGGING

KH2 is suitable for a wide range of applications ranging from permanent installations to large touring applications. Please check all the available accessories as well as the *Suspending the Concert Series* and the *Stacking the Concert Series* guides on the [KH2 web page](#).

12. SERVICE

To obtain service:

- 1) Contact the official K-array distributor in your country. Your local distributor will direct you to the appropriate service center.
- 2) If you are calling for service, please have the serial number(s) of the unit(s) available for reference. Ask for Customer Service and be prepared to describe the issue clearly and completely.
- 3) If the problem cannot be resolved over the phone, you may be required to send the unit in for service. In this instance, you will be provided with an RA (Return Authorization) number which should be included on all shipping documents and correspondence regarding the repair. Shipping charges are the responsibility of the purchaser.

Any attempt to modify or replace components of the device will invalidate your warranty. Service must be performed by an authorized K-array Service Center.



Cleaning:

Use only a soft, dry cloth to clean the unit. Do not use any solvents, chemicals, or cleaning solutions containing alcohol, ammonia, or abrasives. Do not use any sprays near the product or allow liquids to spill into any openings.

13. TECHNICAL SPECIFICATIONS

	ACOUSTICS		AMPLIFIER
Power handling	750 + 250 W	Type	1 module class D - DSP controlled
Max power	2000 W ⁽¹⁾	Subwoofer Power Output	2 x 1000 W @ 8 Ω 1% THD + NOISE ⁽⁵⁾
Frequency range (-10 dB)	70 Hz - 19 kHz ⁽²⁾	Protections	Over Temp. (Power Limiting - Thermal Shutdown), Short Circuit/Overload Output Protection, Power Limiting, Clip Limiter/Permanent Signal Limiter, High Frequency Protection
SPL 1W/1mt	99 dB ⁽³⁾		
Maximum SPL	130 dB (cont.) - 136 dB (peak) ⁽⁴⁾		
	COVERAGE		AC POWER
Horizontal	110°	Nominal power requirements	100 - 240 Vac ± 10% 50-60 Hz
Vertical	20° (preset dependent)	Operating Range	85 - 265 Vac (auto-range)
	CROSSOVER		CONSUMPTION
Type	Electronic	Power factor (cosφ)	>0.90 @ 4Ω full power
Frequency	1200 Hz	1/8 rated power (pink noise)@ 4Ω	300 W
	TRANSDUCERS		CERTIFICATION
Type	2 X 8" Neodymium magnet woofer with 2.5" voice coil 2 X 1.4" compression driver with 2.5" voice coil	IP	53
	AUDIO IN/OUT	Dimensions	83.9 cm x 28.5 cm x 21.0 cm (33.0" x 11.2" x 8.3")
Analog connectors	2 male + 2 female 3-pin balanced XLR	Weight	29.0 kg (63.9 lbs) connecting hardware included
Digital connectors	1 male + 1 female 3-pin balanced XLR		
	REMOTE CONTROL INPUT		
Connectors	1 male + 1 female XLR parallel 1 USB B Jack serial converter		

Notes for data

1. Maximum RMS applicable power for a musical signal. The reference signal is the one proposed by EIAJ standard
2. With dedicated preset;
3. Measured @4 mt then scaled @1 mt;
4. Measured with musical signal
5. EIAJ Test Standard, 1KHz, 1%THD

New materials and design are introduced into existing products without previous notice. Present systems may differ in some respects from those presented in this catalogue.