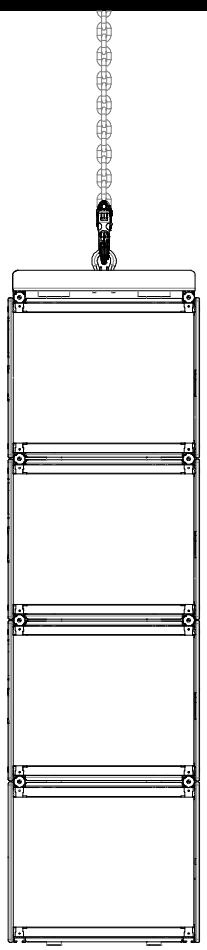
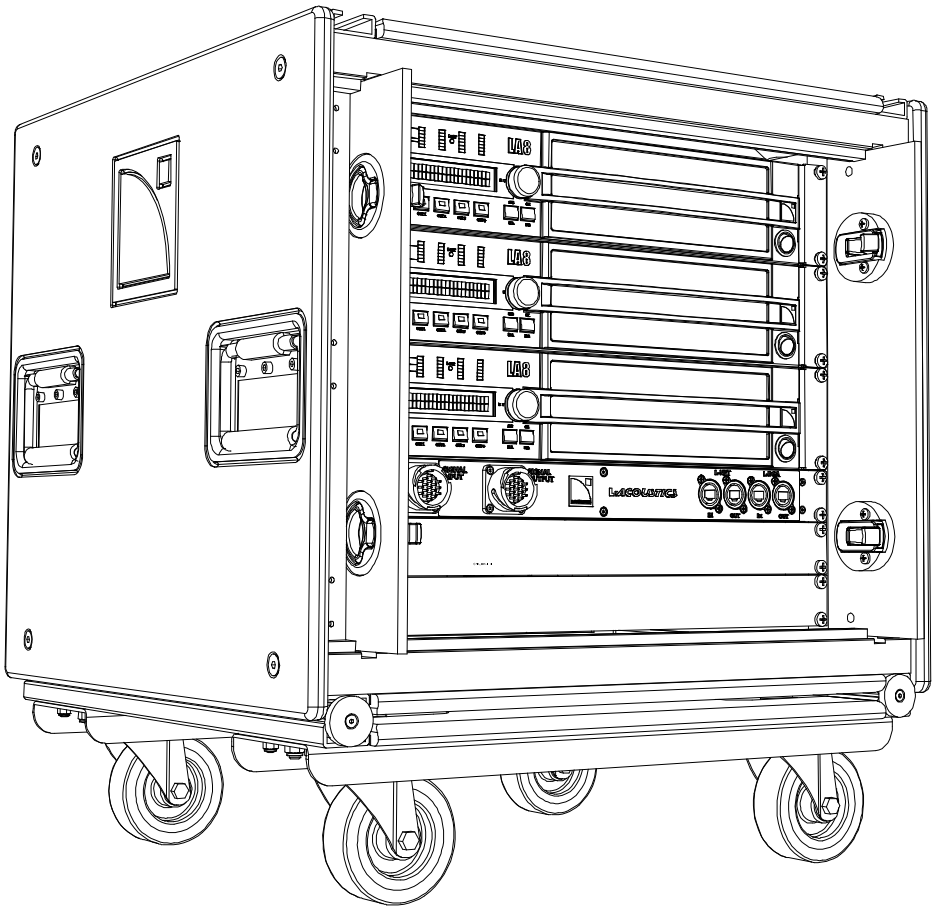
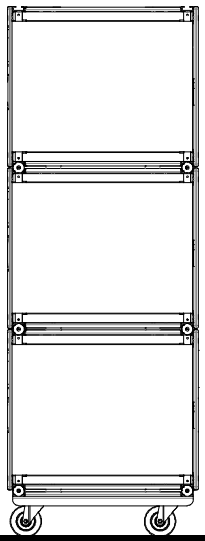
LA-RAK TOURING RACK

USER MANUAL

VERSION 1.0







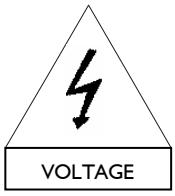
1 SAFETY WARNINGS

All information hereafter detailed applies for the **L-ACOUSTICS® LA-RAK Touring Rack** designated in this section as **"the product"**. The LA-RAK product includes the following components: **RK 9U** cabinet, **LA-POWER** power distribution panel, **LA-PANEL** signal distribution panel, and **LA8** amplified controllers.

1.1 Symbol description

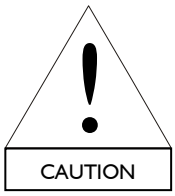
1.1.1 Symbols employed in this manual

Throughout this manual the potential risks are indicated by the following symbols:

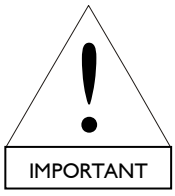


The VOLTAGE symbol indicates a potential risk of electric shock that could be life threatening.
In addition, the product may also be seriously damaged.

The WARNING symbol indicates a potential risk of physical harm to the user or people within close proximity to the product.
In addition, the product may also be damaged.



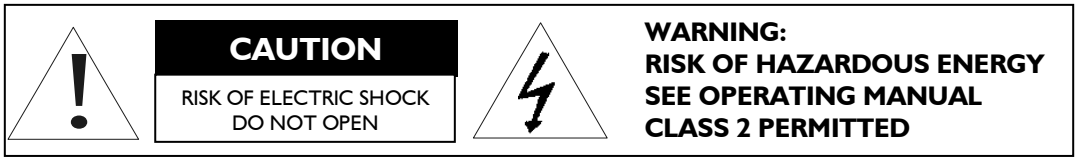
The CAUTION symbol notifies the user about information to prevent possible product damage.

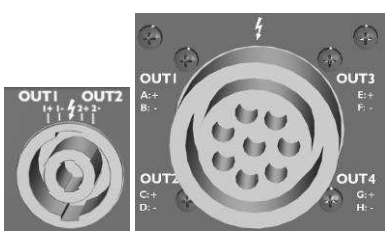


The IMPORTANT symbol is a notification of an important recommendation of use.

1.1.2 Symbols indicated on the product

As the product is an electrical device, it represents potential hazard for the user. For this reason the user may pay particular attention to the symbols that are indicated on the covers of the product electrical components:

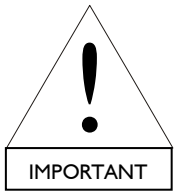




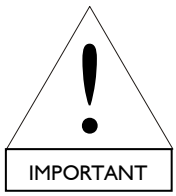
On the rear panel of the LA8 amplified controllers, the lightning flashes symbols next to the 4-pin Speakon® and 8-pin CA-COM® connector sockets indicate that the product can deliver high output voltages that are potentially life threatening. Connections between the product and a speaker should always be done with an all ready-made lead. Never attempt to touch any exposed speaker wiring whilst the amplified controller is operating without disconnecting the connector first.

1.2 Important safety instructions

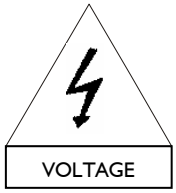
1. **Read this manual**
2. **Heed all safety warnings**
3. **Follow all instructions**
4. **The user should never incorporate equipment or accessories not approved by L-ACOUSTICS®**



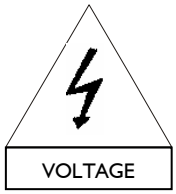
5. Environments
Use the product only in E1, E2, E3, or E4 environments according to EN55103-2 standard.



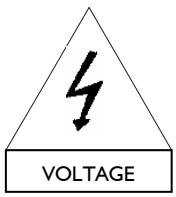
6. Radio interference
A sample of this product has been tested and complies with the limits for the EMC (European Electro Magnetic Compatibility) directive. These limits are designed to provide reasonable protection against harmful interference from electrical equipment. However, there is no guarantee that interference will not occur in a particular installation.



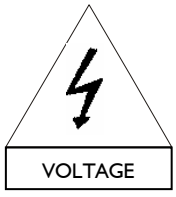
7. Power cord caution
Do not use the product if any power cord is broken or frayed.
Protect any power cord from being walked upon or pinched, particularly at the plugs and the points where the power cords exit from the apparatus.



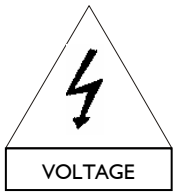
8. Mains supply (see section 6.5 for details)
Only connect the product to an appropriate three-phase AC circuit and outlet.
Consult an electrician if the output voltage of the local AC mains is not known.
Any electric device must be approved for the local voltage & current rating.
The specific electrical safety regulations of the country of use must be strictly applied.
Warranty will not cover damages caused by a mains wiring error.



9. Grounding
The product may only be connected to mains power supply tied to earth. If the local outlet is obsolete, consult an electrician.
The LA-POWER is fitted with grounding-type sockets. Do not defeat the earth connections between the sockets and the product chassis.



10. Lightning storms
During lightning storms disconnect the product from mains.
Switching the amplified controllers off does not disconnect them from mains. Therefore, disconnecting can only be achieved by removing the LA-POWER three-phase male plug from mains.



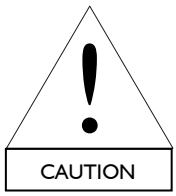
11. Interconnections

When connecting the product to other equipment, turn the power off and unplug all of the equipment from the supply source. Failure to do so may cause an electric shock and serious personal injury. Read the user manual of the other equipment carefully and follow the instructions when making the connections.

Do not connect amplified controller output in parallel or series with any other amplifier output or other voltage source (such as a battery, mains source, or power supply) regardless of whether the product is turned on or off.

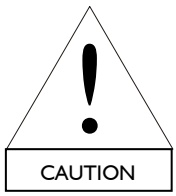
12. Over power risks

The product is very powerful and can be potentially dangerous to both loudspeakers and humans alike. Even when using the amplified controller front panel attenuators to reduce the gain it is still possible to reach full output power if the input signal level is high enough.



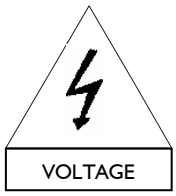
13. Ventilation

Openings in the LA8 amplified controller cabinets are provided for ventilation to prevent from overheating so as to ensure reliable operation. These openings must not be blocked or covered. The product should be installed in accordance with the manufacturer instructions given in this manual.



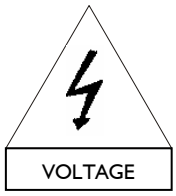
14. Heat

Do not operate the product near any heat source, such as radiators or other devices.



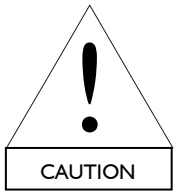
15. Water and moisture

To prevent fire or shock hazard, do not expose the product to rain or moisture.
Do not use the product near water.
Do not operate the product while wet.



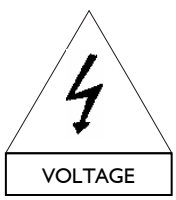
16. Interference with external objects and/or liquids

Never push objects of any kind into the product through openings as they may touch dangerous voltage points or short out parts that could result in fire or electric shock. Never spill liquid of any kind on the product.



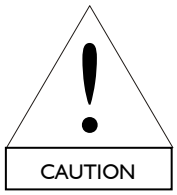
17. Cleaning

Unplug the product from the mains power supply before cleaning.
Do not use liquid or aerosol cleaners.
Use only dry cloth when cleaning any product's electrical part.



18. Servicing and replacement parts

Do not attempt to service any product component as removing covers may expose to dangerous voltage or other hazards.
All service and repair work must be carried out by an L-ACOUSTICS® authorized dealer.
The use of unauthorized replacement parts may result in injury and/or damage through fire, electric shock, or other electricity-related hazards.



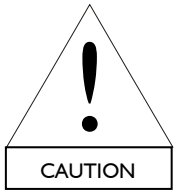
19. Conditions which require immediate service

Servicing is required when the product has been damaged in any way such as:

- Any power supply cord or socket is damaged.
- Liquid has been spilled or an object has fallen into any product's electrical component.
- The product has been exposed to rain or moisture.
- The product was dropped or the housing is damaged.
- The product does not operate normally.

20. System parts and rigging inspection

All system components must be inspected before use in order to detect any possible defects.
Please refer to the "Care and Maintenance" section of this manual as well as any other manuals pertaining to the system for a detailed description of the inspection procedure.
Any part showing any sign of defect must immediately be put aside and withdrawn from use to be inspected by qualified service personnel.



21. Mounting instructions

Do not place the product on an unstable cart, stand, tripod, bracket, or table. The product may fall and be seriously damaged, and may cause serious human injury. Any mounting of the product should follow the manufacturer instructions and should use the mounting accessories recommended by the manufacturer, as described in this manual.

22. Personnel qualification

Installation of a rack assembly should only be carried out by qualified personnel that are familiar with the rigging techniques and safety recommendations outlined in this manual.

23. Personnel health and safety

During installation of a rack assembly personnel should wear protective headgear and footwear at all times. Under no circumstances personnel should climb on the rack assembly.

24. Additional rigging equipment

L-ACOUSTICS® is not responsible for any rigging equipment and accessories that are not manufactured by L-ACOUSTICS®.
It is the user's responsibility to ensure that the Working Load Limit (WLL) of all additional hardware rigging accessories is greater than the total weight of the rack assembly in use.

25. Suspension points

It is the user's responsibility to ensure that the Working Load Limit (WLL) of the suspension points and/or chain hoists is greater than the total weight of the rack assembly in use.

26. System load capacity and setup safety limits

Load capacity and setup safety limits when flying or stacking a rack assembly should be strictly followed according to the instructions outlined in this manual.

27. Local regulations

Some countries require higher Ultimate Strength Safety Factors and specific rigging approvals. It is the user responsibility to ensure that any overhead suspension of L-ACOUSTICS® systems has been made in accordance with all applicable local regulations.

As a general rule, L-ACOUSTICS® recommends the use of safety steel at all times.

28. Flying a rack assembly

Always ensure that nobody is standing underneath the rack assembly when it is being raised.

As the assembly is being raised, check each individual rack to make sure that it is securely fastened to the component above. Never leave the system unattended during the installation process.

29. Ground stacking a rack assembly

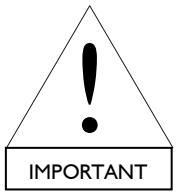
Do not ground stack the rack assembly on uneven ground or platform.

If the system is ground stacked on a structure, platform, or stage always check that this last can support the total weight of the system.

Secure the system to the structure, platform, or stage using ratchet straps or any other applicable device.

30. Dynamic load

When a system is deployed in an open air environment, wind effect should be taken into account. Wind can produce dynamic stress to the rigging components and suspension points. If the wind force exceeds 6 bft (Beaufort scale) it is highly recommended to lower down and/or secure the rack assembly.



31. Manual

Keep this manual in a safe place during the product lifetime.

This manual forms an integral part of the product.

Reselling of the product is only possible if the user manual is available.

Any changes made to the product have to be written in this manual, particularly in the event of resale.

1.3 EC declaration of conformity

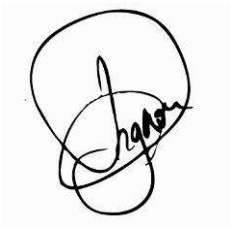
L-ACOUSTICS®
13 rue Levacher Cintrat
Parc de la Fontaine de Jouvence
91462 Marcoussis Cedex
France

States that the following products:
Touring rack, LA-RAK (composed of the: Rack cabinet, RK 9U
Amplified controllers, LA8
Power distribution panel, LA-POWER
Signal distribution panel, LA-PANEL)
Flying frame, LA-RAK BUMP

Are in conformity with the provisions of:
Machinery Directive, 98/37/EC
Low Voltage Directive, 73/23/EC
Electro-Magnetic Compatibility Directive, 89/336/EC

Applied rules and standards:
EN ISO 12100-1: 2004 (Mechanical Safety)
DIN 18800 (Mechanical Structure)
BGV-C1 (Mechanical Standard applied in Germany)
EN60065 (Electrical Safety)
EN55103-1 (Emission)
EN55103-2 (Immunity)

Established at Marcoussis, France
June 2nd, 2008



Christophe Pignon

2 CONTENTS

3 INTRODUCTION

3.1 Welcome to L-ACOUSTICS®

Thank you for purchasing the **L-ACOUSTICS® LA-RAK Touring Rack**.

This manual contains essential information on installing and operating the product correctly and safely. Read this manual carefully in order to become familiar with these procedures.

As part of a continuous evolution of techniques and standards, L-ACOUSTICS® reserves the right to change the specifications of the product and the content of this manual without prior notice. Please check the L-ACOUSTICS® web site @ www.l-acoustics.com on a regular basis for latest update.

Should the product requires repair or if information about the warranty is needed, please contact an approved L-ACOUSTICS® distributor. In order to obtain the address of the nearest distributor go to the L-ACOUSTICS® web site.

3.2 Unpacking

Carefully open the shipping carton and check the product for any noticeable damage. Each L-ACOUSTICS® product is tested and inspected before leaving the factory and should arrive in perfect condition.

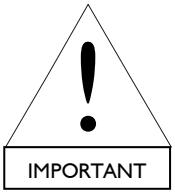
If found to be damaged, notify the shipping company or the distributor immediately. Only the consignee may initiate a claim with the carrier for damage incurred during shipping. Be sure to save the carton and packing materials for the carrier's inspection.

The **LA-RAK package** consists of the following components (see from Figure 4 to Figure 7):

- One **L-ACOUSTICS® RK 9U** cabinet with one detachable **dolly board** and two **coupling bars**.
- Three **L-ACOUSTICS® LA8** amplified controllers.
- One **L-ACOUSTICS® LA-POWER** 230 V power distribution panel.
- One **L-ACOUSTICS® LA-PANEL** patch panel with eight **XLR cables** and six **CAT5e U/FTP cables**.

The **LA-RAK BUMP package** consists of the following components (see Figure 8):

- One **L-ACOUSTICS® LA-RAK BUMP** flying frame.
- Two ⅝" shackles.



The power distribution panel mounted into the rack must be adapted to the mains rating of the country of use.

- In Europe use the LA-POWER device (230 V version) presented all along this manual.
- In USA use the LA-POWER US device (120 V version) presented in Appendix 9.
- In any other country contact a local L-ACOUSTICS® distributor.

4 LA-RAK SIGNAL & POWER DISTRIBUTION SYSTEM

The **L-ACOUSTICS® LA-RAK Touring Rack** is the central element of the new L-ACOUSTICS® system architecture built upon the LA8 amplified controller. It offers an advanced rack solution for all L-ACOUSTICS® systems covering signal and power distribution in a comprehensive plug and play touring package. LA-RAK was created as a universal platform designed to facilitate cross-rental and to ensure compatibility with the legacy analog cabling standard of L-ACOUSTICS® systems.

The components of the LA-RAK related L-ACOUSTICS® systems are as follows (see Figure 1):

K1, KUDO®, V-DOSC®	⇨	Full range active 3-way WST® enclosures
K1-SB	⇨	Arrayable LF enclosure for K1
dV-DOSC, ARCS®	⇨	Full range active 2-way WST® enclosures
dV-SUB	⇨	Subwoofer extension for dV-DOSC
115XT HiQ	⇨	Full range active 2-way coaxial enclosure
SB118, SB28	⇨	Subwoofer enclosures
LA-RAK	⇨	Amp rack for three **LA8** amplified controllers
LA NETWORK MANAGER	⇨	Remote control software
SOUNDVISION	⇨	Acoustical and mechanical 3D modeling software

The LA-RAK is compatible with standard L-ACOUSTICS® accessories. These accessories include the **L-ACOUSTICS® DOM2** and **DOM30** analog signal cables with respective lengths of 2 m/6.5 ft and 30 m/100 ft. These cables are for connecting an analog sound source (mixing console or EQ device) to the LA-RAK or for linking two LA-RAK. Each cable is a symmetric 6-pair cable fitted with PA-COM® 19-pin female connectors (CA-COM® compatible). **Note:** Connection to the XLR outputs of the analog source needs the addition of the **DOMP-2** and **DOMF** cables (see section 6.6.1).

Are also available the **L-ACOUSTICS® SP.7**, **SP10**, **SP25**, **DO.7**, **DO10**, **DO25**, **DOFILL-LA8**, **DO3WFILL**, and **DOSUB-LA8** loudspeaker cables. The respective lengths are 0.7 m/2.3 ft for a ".7" cable, 10 m/32.8 ft for a "10" cable, and 25 m/82 ft for a "25" cable. These cables allow connection of the enclosures directly to the LA8 amp outputs. Each cable is a 4 or 8-conductor cable with 4 mm^2 conductor cross-section (13 SWG, 11 AWG) and features Speakon® NL4 and/or PA-COM® 8-pin connectors. For more details refer to each enclosure's **User Manual** as well as the **"LA8 – User Manual"** (all available on the L-ACOUSTICS® web site).

Each system is driven and powered by the **L-ACOUSTICS® LA8** amplified controller. This ensures intelligent protection, filtering, and equalization of the enclosures. Four amp channels are provided along with OEM factory preset library for optimization of the system performances within the limits of the recommended configurations.

Each system design configuration should first be modeled and studied using the **L-ACOUSTICS® SOUNDVISION** software. The software predictions are based on the preset parameters stored in the amplified controller.

Up to 253 amplified controllers can be interconnected through the proprietary **L-ACOUSTICS® L-NET** network and be controlled using the **L-ACOUSTICS® LA NETWORK MANAGER** software. **Note:** An additional **Ethernet® switch** is necessary to achieve star network topology.

The LA-RAK is digital audio ready with sockets to connect to the proprietary **L-ACOUSTICS® L-DGA** network. This option will be available as a future development on the amplified controllers. **Please check the L-ACOUSTICS® web site on a regular basis for latest update.**

Detailed description on the use of the LA8 amplified controller, SOUNDVISION and LA NETWORK MANAGER softwares is beyond the scope of this manual. Please refer to the applicable documentation (available on the L-ACOUSTICS® web site).

LA NETWORK MANAGER

ETHERNET SWITCH
(not provided)

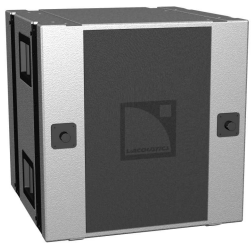
LA-RAK

SOUNDVISION

KUDO®

ARCS®

V-DOSC®



dV-SUB

dV-DOSC

K1

SB118

115XT HiQ

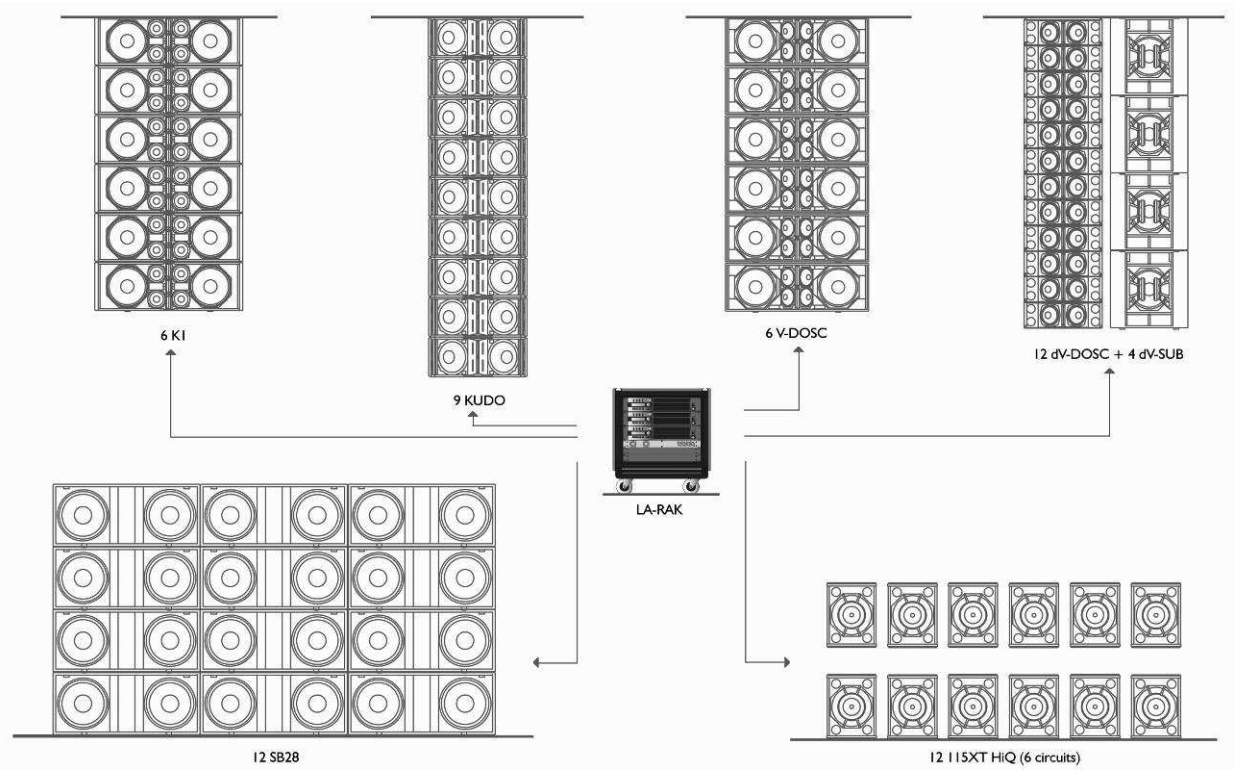
K1-SB

SB28

Figure 1: L-ACOUSTICS® components which connect to the LA-RAK

The LA-RAK working principle is entirely modular and the engineer can physically assemble and interconnect multiple elements to fit numerous applications. The LA-RAK configuration based on a multiple of 3 LA8 yields the maximum flexibility and power resources for any L-ACOUSTICS® system from compact coaxial systems up to KUDO® and K1 stadium line source array systems, as it is shown in Figure 2:

LA-RAK power capability (one system driven by all 3 LA8)



LA-RAK flexibility capability (split ⅓ subs + ⅔ tops)

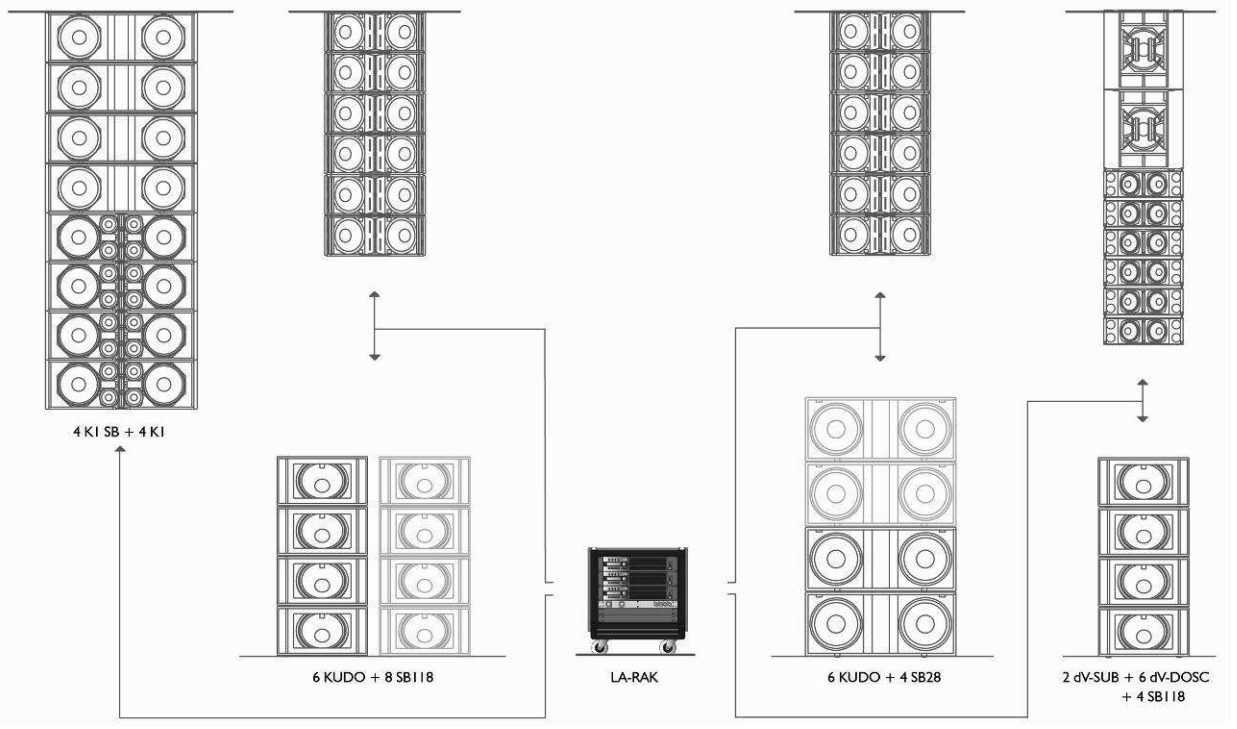


Figure 2: LA-RAK power and flexibility capability

5 LA-RAK TOURING RACK

The **L-ACOUSTICS® LA-RAK** is composed of the RK 9U cabinet in which are mounted three LA8 amplified controllers as well as the LA-POWER and LA-PANEL power and signal distribution panels. In addition, the LA-RAK can be flown under the LA-RAK BUMP flying frame.

Front

Rear

Figure 3: Equipped LA-RAK

The **L-ACOUSTICS® RK 9U** cabinet is a dual structure consisting of a rubber shock inner steel frame braced by an external aluminum frame sided with highly resistant polyethylene panels. This ensures structural integrity while offering decoupling and maximum protection of the electronics inside the rack. Two retractable doors protect the internal components during transport.

On the front face, two extra U spaces can be fitted with a shelf to receive additional switches for L-NET network star topologies.

On the rear face, two hinge-mounted panels cover and protect the analog modulation and network connectors of the amplified controllers to create a neat and tangle-free cable environment. The rear central part of the amplified controllers remains accessible with its CA-COM® and Speakon® sockets and therefore offers the same functionality as a speaker output patch panel (see section 6.8).

The RK 9U is equipped in standard with a detachable transport dolly board and two coupling bars. These last also allow arraying several LA-RAK in flown or stacked configurations.

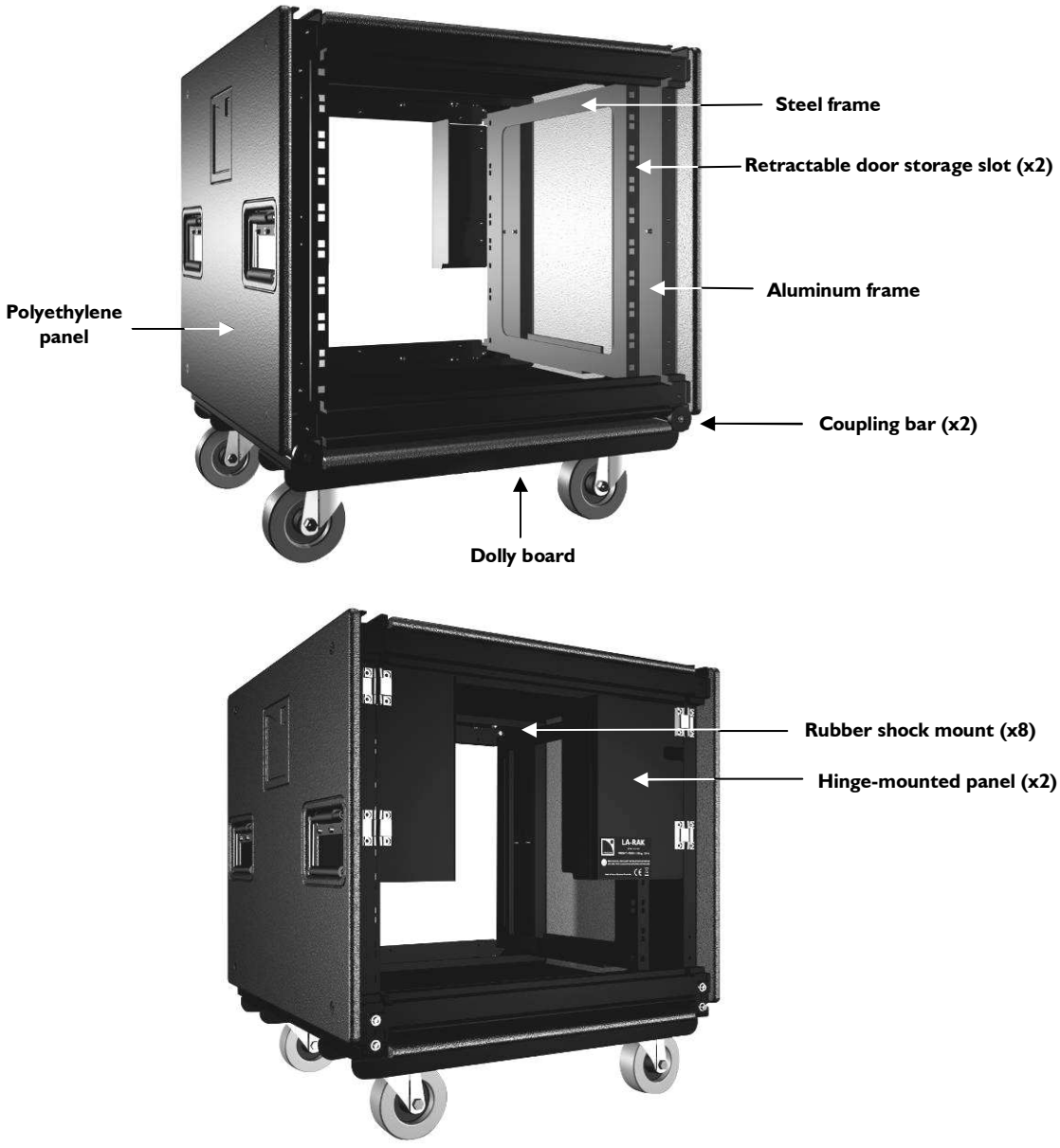


Figure 4: The RK 9U cabinet

The **L-ACOUSTICS® LA8** amplified controller belongs to the new generation of high-end integrated controllers entirely dedicated to the comprehensive operation of L-ACOUSTICS® loudspeaker systems. The LA8 combines in a 2U lightweight chassis the resources of a 2 x 4 DSP engine driving four channels of amplification delivering up to 1800 W each at 4 ohms, a storage capacity of 99 presets, a user-friendly front panel interface, two I/O Ethernet® connection ports for network remote control, a connection panel for analog audio inputs, and speaker outputs.

Figure 5: The LA8 amplified controller

The **L-ACOUSTICS® LA-POWER** is a 2U/19" I/O 230 V power distribution panel featuring a 32 A three-phase circuit: one IN plug and one LINK OUT socket to power a secondary rack. This configuration allows the power to be automatically balanced with an even number of LA8 per phase.

Three "Shuko" AC outlets (L1, L2, and L3) are available for LA8 and three additional outlets (1 x "Shuko" and 2 x IEC) are to power auxiliary accessories such as Ethernet® switches, portable computer, and the like. All circuits are protected by discrete breakers and three LED help monitor phase presence.

Note: The three LA8 AC outlets can be replaced by a 3 x 20 A Powercon® plate using the predrilled template fitted with four M5 screws (the "M5" notation refers to the European standard, see applicable external documentation).

Note: See Appendix 9 for LA-POWER US description or contact a local L-ACOUSTICS® representative for any country located outside Europe and USA.

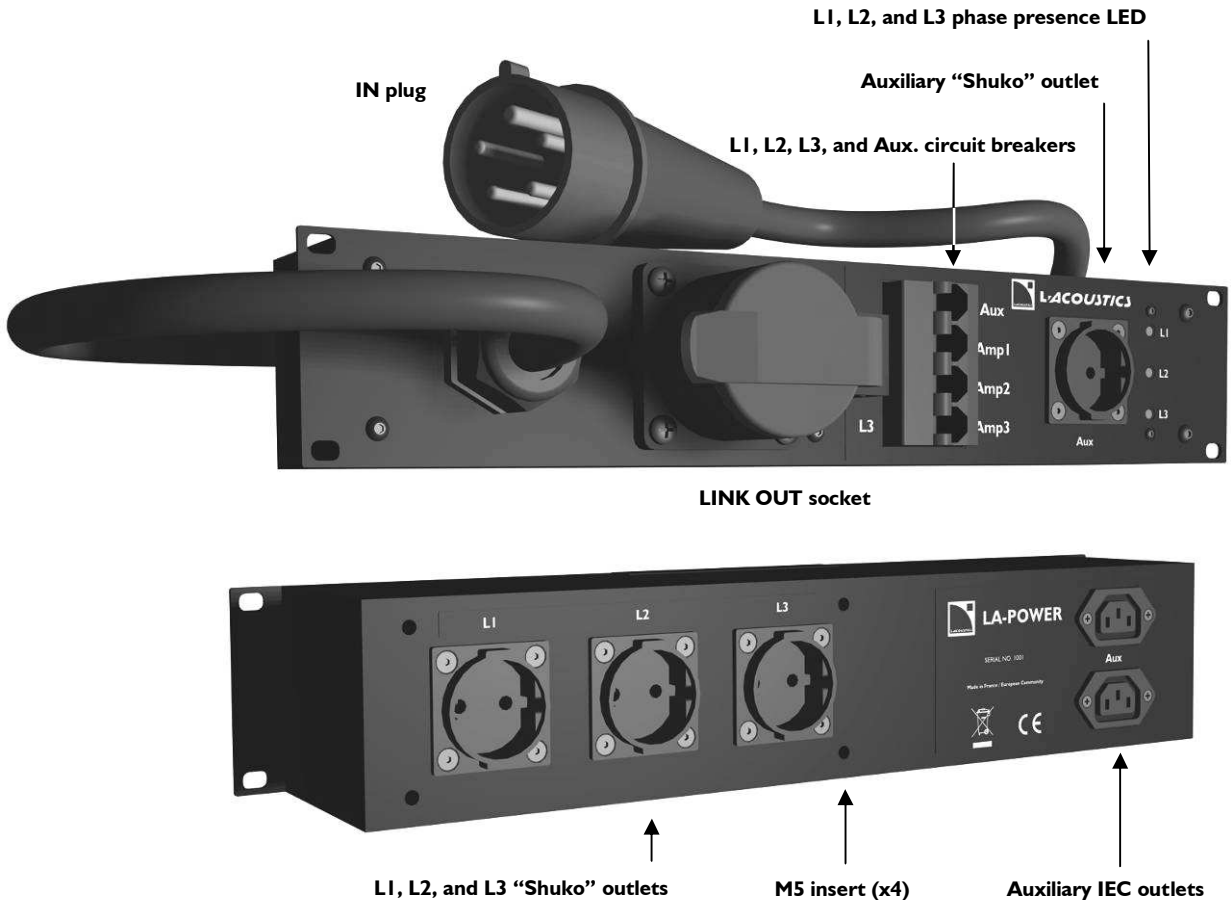


Figure 6: The LA-POWER

The **L-ACOUSTICS® LA-PANEL** front patch panel allows distribution of analog audio signals using I/O PA-COM® 19-pin connectors, ensuring that all available 6 analog inputs of amplified controllers can be used within a single LA-RAK and linked out to the next one. The PA-COM® connectors ensure compatibility with the previous L-ACOUSTICS® standard (DOM2, DOM30, DOMF, and DOMM cables).

The panel also features 4 Ethercon® I/O sockets for L-NET control & monitoring network and L-DGA digital audio network (available as a future development).

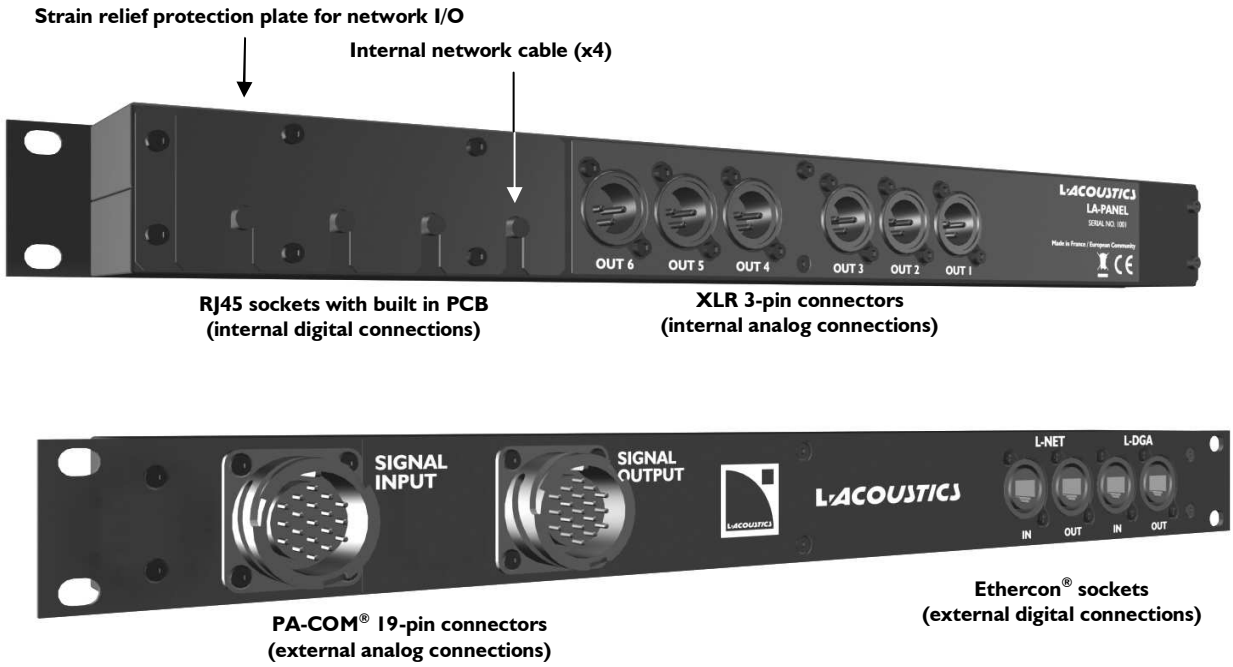


Figure 7: The LA-PANEL

The **L-ACOUSTICS® LA-RAK BUMP** flying frame is engineered to fly 4 LA-RAK for a drive capacity of up to 24 K1 enclosures. It can be flown using single pick-point and secured to an additional safety point. It is assembled with bolts for mechanical integrity visual check and is protected by polyester-coating to enhance weather resistance.

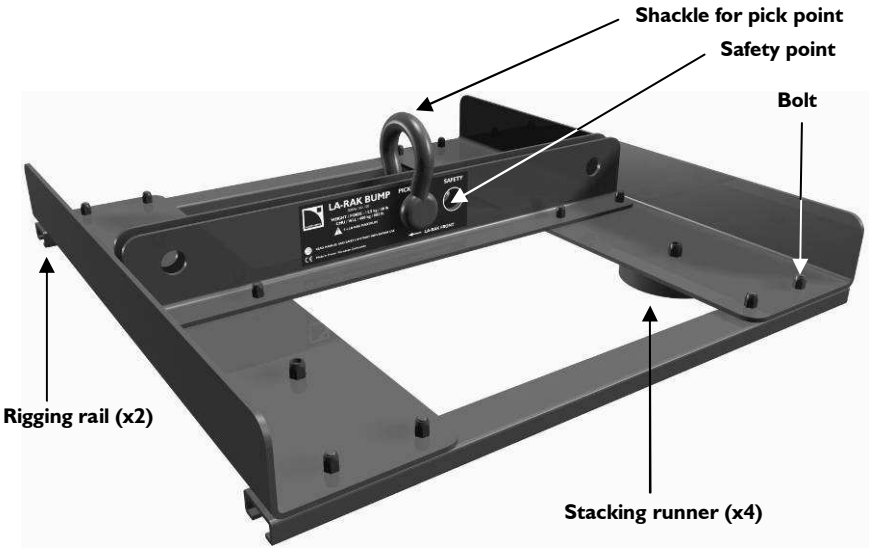


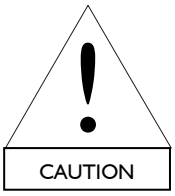
Figure 8: The LA-RAK BUMP

6 INSTALLATION

6.1 Mounting components inside the LA-RAK

The **9U inner frame** (see Figure 4) is for mounting components to both front and rear faces:

- The LA-PANEL and optional switches mount to the front face using four screws and washers each.
- The LA-POWER mounts to the rear face using four screws and washers.
- Each LA8 mounts to both front and rear faces using eight screws and washers.



During transport or while on tour it is essential that the LA8 controllers are rear supported in addition to the front panel mounting. Use the rear rack support brackets provided with each LA8 or the LA-RAK optional spacers (see references in section 7.3).

6.2 Shipping the LA-RAK

The **removable dolly board** (see Figure 9) is for shipping a vertical array of up to two LA-RAK. It secures to the bottom LA-RAK using two **coupling bars** (see section 6.3).

It is recommended to use the removable dolly board for shipping the LA-RAK.

A maximum of **two LA-RAK** can ship onto **one dolly board**.

6.3 Stacking or flying the LA-RAK

The LA-RAK features four fully integrated rigging rails on top and bottom faces as well as four stacking runners which mate with four runner guides. These are for assembling several LA-RAK in flown or stacked configurations such as:

- Stacking a vertical array of up to 3 LA-RAK onto one **dolly board**.
- Flying a vertical array of up to 4 LA-RAK underneath the **L-ACOUSTICS® LA-RAK BUMP** flying frame or onto the **L-ACOUSTICS® K1-BUMP** flying frame.

6.3.1 Stacking procedure

All along the procedure:

- Strictly follow the sequence of the successive steps.
- Systematically ensure that each spring-loaded safety is in locking position.

1. Put a first LA-RAK at the stacking location.

2. Take a second LA-RAK and remove its dolly board:

- **a.** Turn a spring-loaded safety and slide out the coupling bar.
- **b.** Repeat for the second coupling bar.

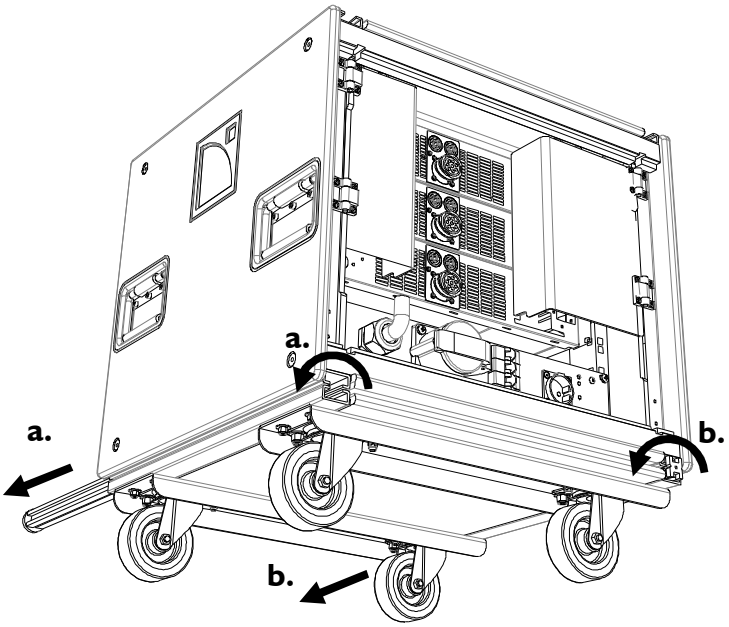


Figure 9: Removing the dolly board from the LA-RAK

3. Lift up the second LA-RAK and put it onto the first one: align the rails and put the stacking runners onto the runner guides.

4. Secure the second LA-RAK to the first one:

- **a.** Turn a spring-loaded safety and slide the coupling bar in along the rails until the safety has returned to locking position (a click should be heard).
- **b.** Repeat for the second coupling bar.

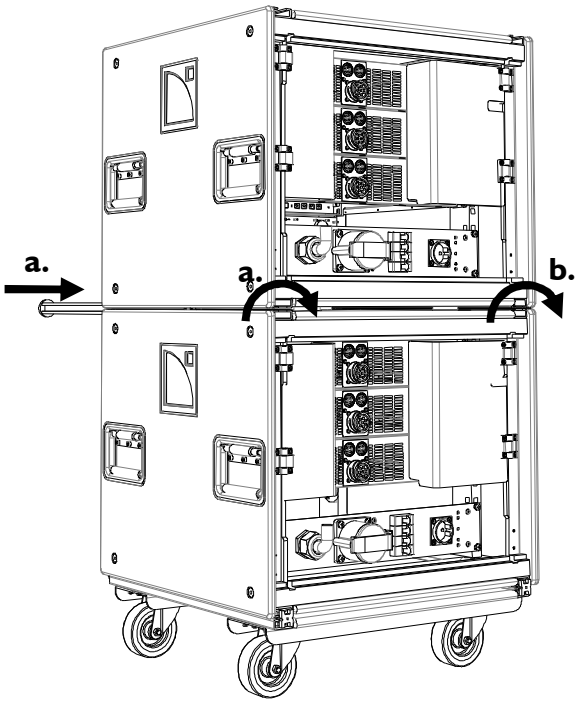


Figure 10: Rigging a second LA-RAK

5. Put a third LA-RAK onto the second one by repeating the steps from 2 to 4.

A maximum of **three LA-RAK** can be stacked onto **one dolly board**.

Secure the LA-RAK stacked assembly to the structure, platform, or stage using ratchet strap or any other applicable device.

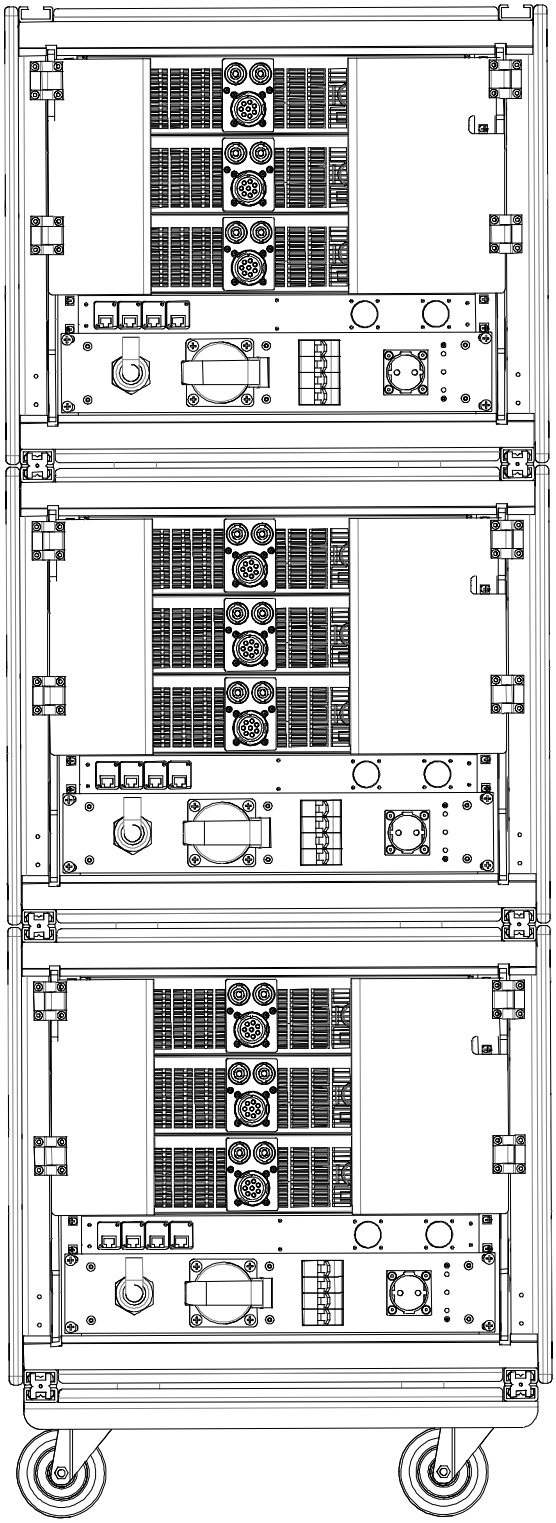


Figure 11: Three stacked LA-RAK (maximum configuration)

6.3.2 Flying procedure using the LA-RAK BUMP

All along the procedure:

- Strictly follow the sequence of the successive steps.
- Systematically ensure that each spring-loaded safety is in locking position and that screw pin is correctly secured on each shackle anchor.

1. Place a first LA-RAK under the rigging point.

2. Remove both coupling bars:
   a. Turn a spring-loaded safety and slide the coupling bar out.
   b. Repeat for the second coupling bar.

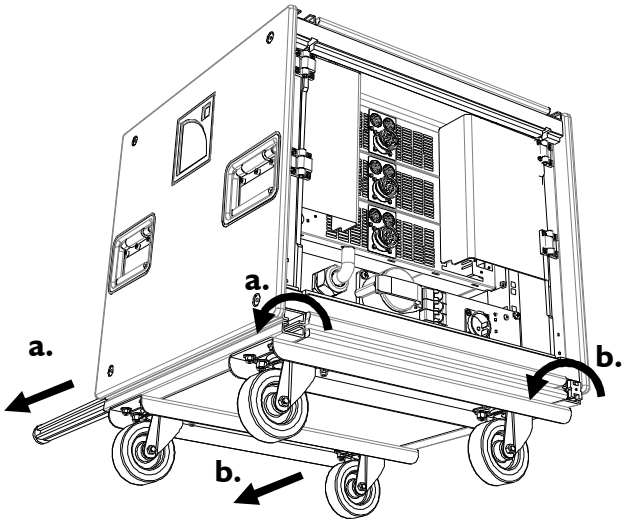


Figure 12: Removing coupling bars from LA-RAK

3. Install the LA-RAK BUMP onto the LA-RAK: align the rails and put the stacking runners onto the runner guides.

Respect the orientation indicated beside the "LA-RAK FRONT" label.

4. Secure the LA-RAK BUMP to the LA-RAK (use both preceding coupling bars):
   a. Turn a spring-loaded safety and slide in the coupling bar along the rails until the safety has returned to locking position (a click is heard).
   b. Repeat for the second coupling bar.

5. Attach the motor hook to the "PICK POINT" shackle.

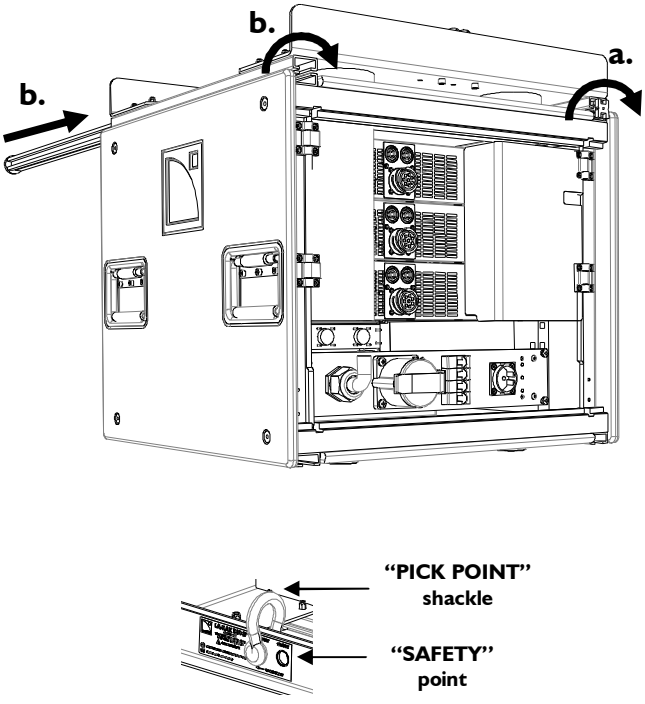


Figure 13: Rigging LA-RAK BUMP to LA-RAK

6. Raise the LA-RAK BUMP/LA-RAK assembly at 0.7 m/2 ft height: the dolly board should separate from the array.

7. Put a second LA-RAK under the rigging point.

8. Remove both coupling bars by repeating step 2.

9. Lower the first LA-RAK so as to install it onto the second one: align the rails and put the stacking runners onto the runner guides.

10. Secure the first LA-RAK to the second one (use both preceding coupling bars):

- **a.** Turn a spring-loaded safety and slide the coupling bar in along the rails until the safety has returned to locking position (a click should be heard).
- **b.** Repeat for the second coupling bar.

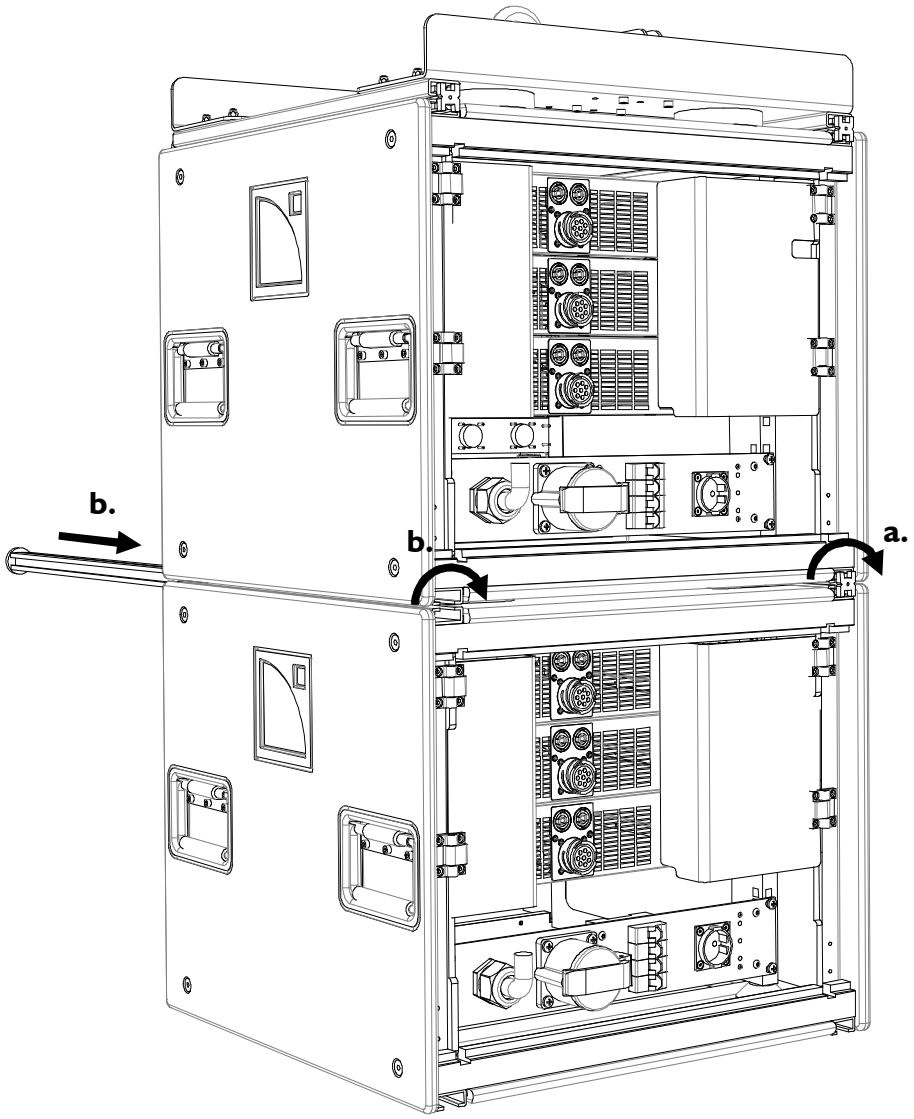


Figure 14: Securing the first LA-RAK to the second one (motor chain not represented)

11. Repeat steps from 6 to 10 for each remaining LA-RAK.

A maximum of **four LA-RAK** can be flown under **one LA-RAK BUMP**.

12. Raise the LA-RAK array at desired height.

Secure the LA-RAK flown array to the main structure using the "SAFETY" shackle (see Figure 13) and a sling.

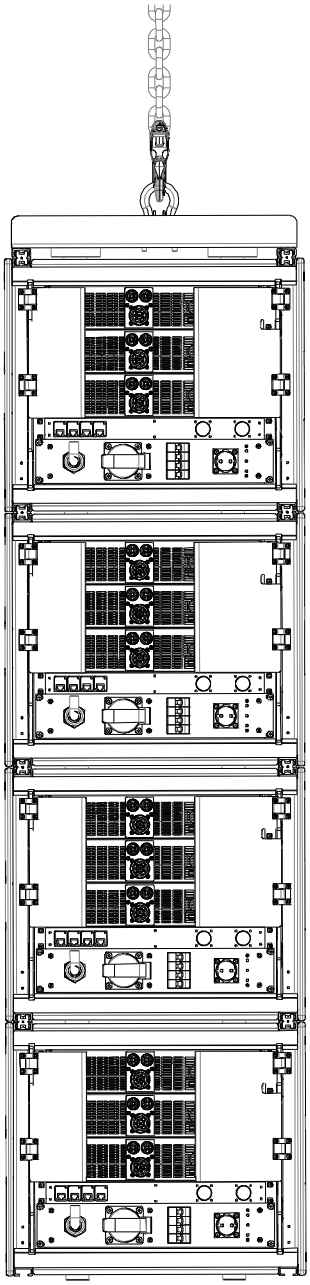


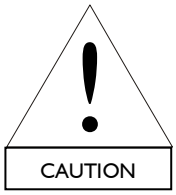
Figure 15: Four flown LA-RAK (maximum configuration)

6.3.3 Flying procedure using the K1-BUMP

Please refer to the **"K1 - Rigging Procedures"** manual (available on the L-ACOUSTICS® web site).

6.4 Amp cooling

Each LA8 amplified controller uses a forced air cooling system to maintain a low and even operating temperature. All fan cooled L-ACOUSTICS® amplified controllers have front to rear airflow.



Before operation ensure that the front filter system of each LA8 is clean and dust free (see the **"LA8 – User Manual"**).

While operating keep the LEXAN® front and rear doors retracted (see below) and do not block the LA8 front and rear air vents.

Apply the following procedure to retract and lock the LEXAN® doors:

- **a.** Detach both doors and slide them along both LA-RAK sides (between the outer aluminum frame and the inner steel frame).
- **b.** Insert and lock both ball locking pins through each door's bottom hole.

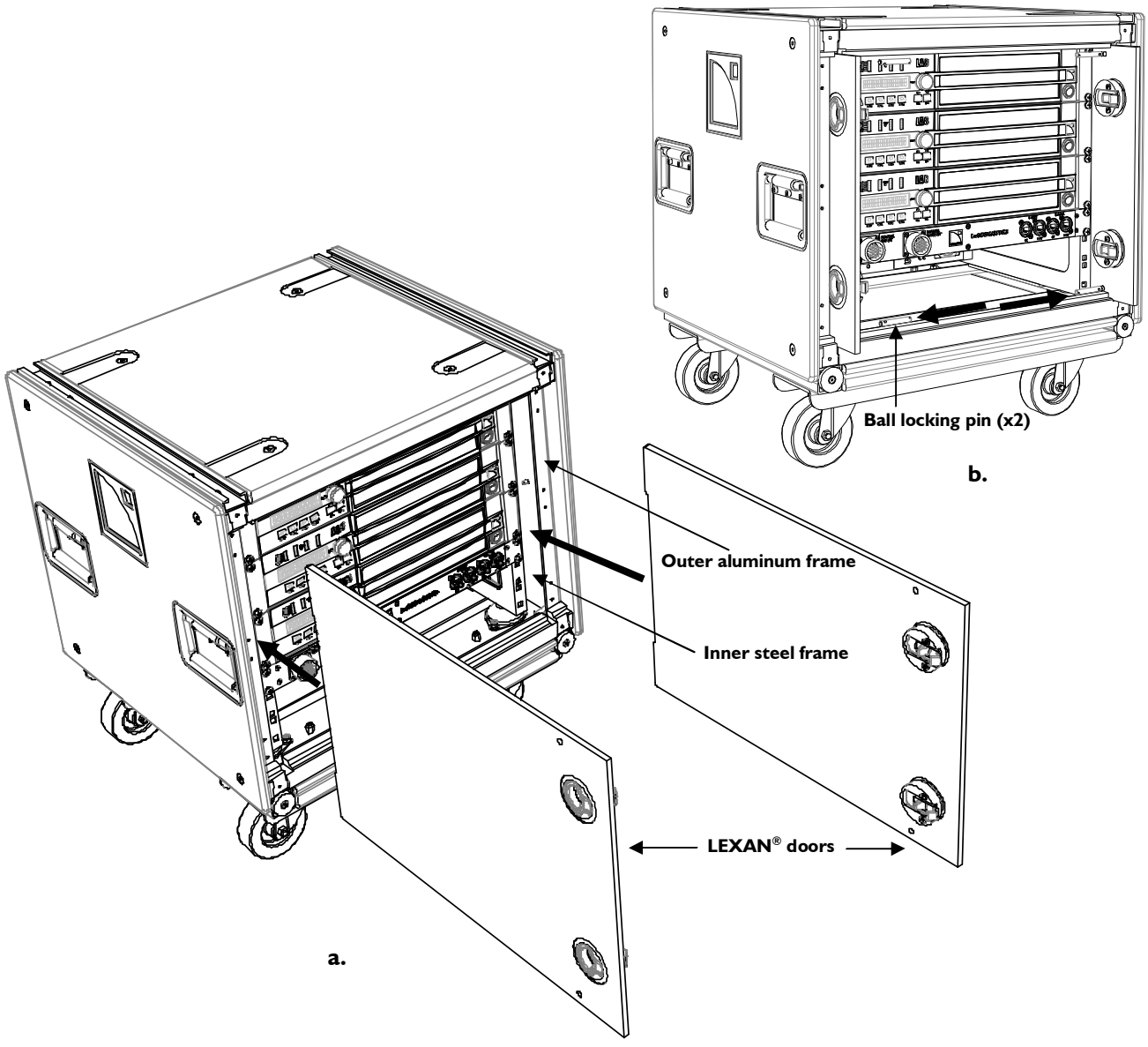
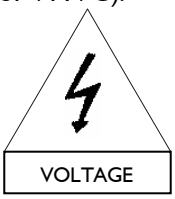


Figure 16: Retracting and locking both LEXAN® doors

6.5 Connecting LA-RAK to AC mains

6.5.1 LA-POWER three-phase circuit

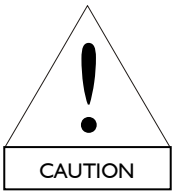
The LA-POWER connects to **230 V (±10 %) / 32 A three-phase AC mains** using the male IN cable plug (P17 - 32 A - 3P+N+G).



The LA-POWER only connects to three-phase AC mains rated 230 V (±10 %) / 32 A, 50 - 60 Hz.

Contact a local L-ACOUSTICS® distributor for countries in which this standard does not apply.

A second LA-RAK can be plugged in the female LINK OUT socket of the first LA-RAK to be powered in parallel.



Powering **two LA-RAK in parallel** is only possible in the 230 V (±10 %) countries.
In this case a maximum of **two LA-RAK** can be powered in parallel by one AC mains outlet.

For any other mains ratings **a maximum of one LA-RAK** can be connected per AC mains outlet.

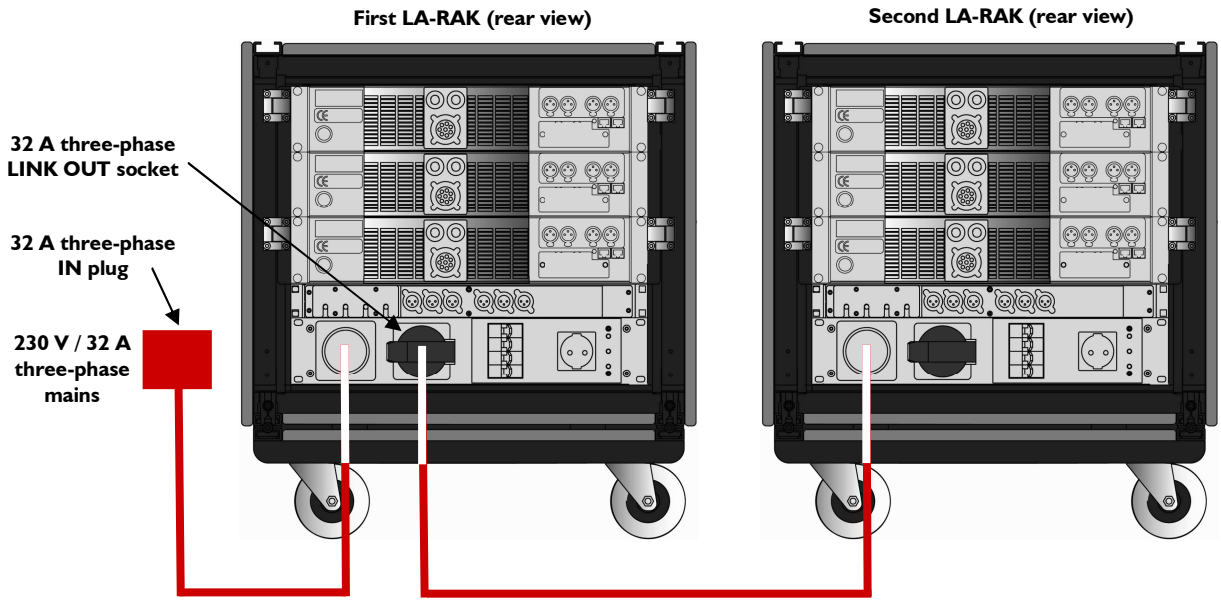
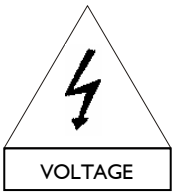


Figure 17: Parallel connection of two 230 V LA-RAK to AC mains

6.5.2 LA-POWER mono-phase circuits



Connect LA-RAK to AC mains **only if** the operating voltage indicated on the LA8 back panels corresponds to the local AC mains rating.

Two LA8 versions are available (also refer to the **"LA8 – User Manual"**):

- A universal 120/230 V (±10 %) version fitted with automatic switch mode power supply.
- A specific 100 V (±10 %) version for Japan.

The LA-POWER three-phase circuit described in section 6.5.1 powers the three mono-phase circuits corresponding to the **L1**, **L2**, and **L3** "Shuko" female outlets located on the rear face. These last allow connection of the three LA8 amplified controllers mounted in the LA-RAK (see Figure 18).

Each outlet is protected by a **16 A type C** circuit breaker located on the front face and three LED help monitor the presence of each phase on the front end of the mains circuit.

The LA-POWER also includes an **auxiliary circuit** protected by the "Aux" **10 A** circuit breaker. This circuit powers one "Shuko" outlet located on the front face (to connect portable computer and the like) and two IEC CEE22 outlets located on the rear face (to connect additional Ethernet® switches).

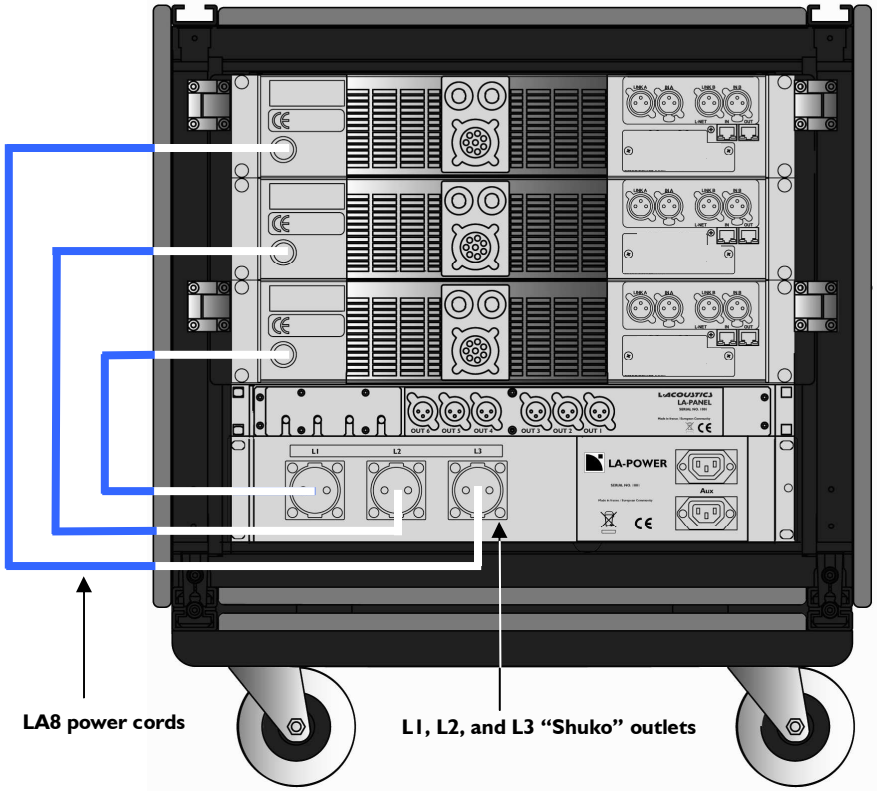


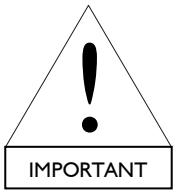
Figure 18: Powering three LA8 within an LA-RAK (LA-POWER rear view)

6.6 Connecting LA-RAK to analog audio source

6.6.1 External analog audio connection

Up to six analog audio signals can be routed from an analog audio source (mixing console or EQ device) to the LA-PANEL front patch panel ("SIGNAL INPUT" PA-COM® 19-pin socket) of a first LA-RAK.

Several additional LA-RAK can be cascaded in parallel by linking each "SIGNAL OUTPUT" socket to the following LA-RAK "SIGNAL INPUT" socket. The six analog audio signals can also be routed from the last LA-RAK to other signal processing devices using the DOMM cable.



Cascading several LA-RAK cause losses in the analog signal. The losses increase in line with the number of LA-RAK and the console output impedance. Typically, cascading 16 LA-RAK will cause a -1 dB loss with a 50 Ω console and a -3 dB loss with a 150 Ω console.

The figure below shows the external analog audio cabling principle including all available L-ACOUSTICS® cables:

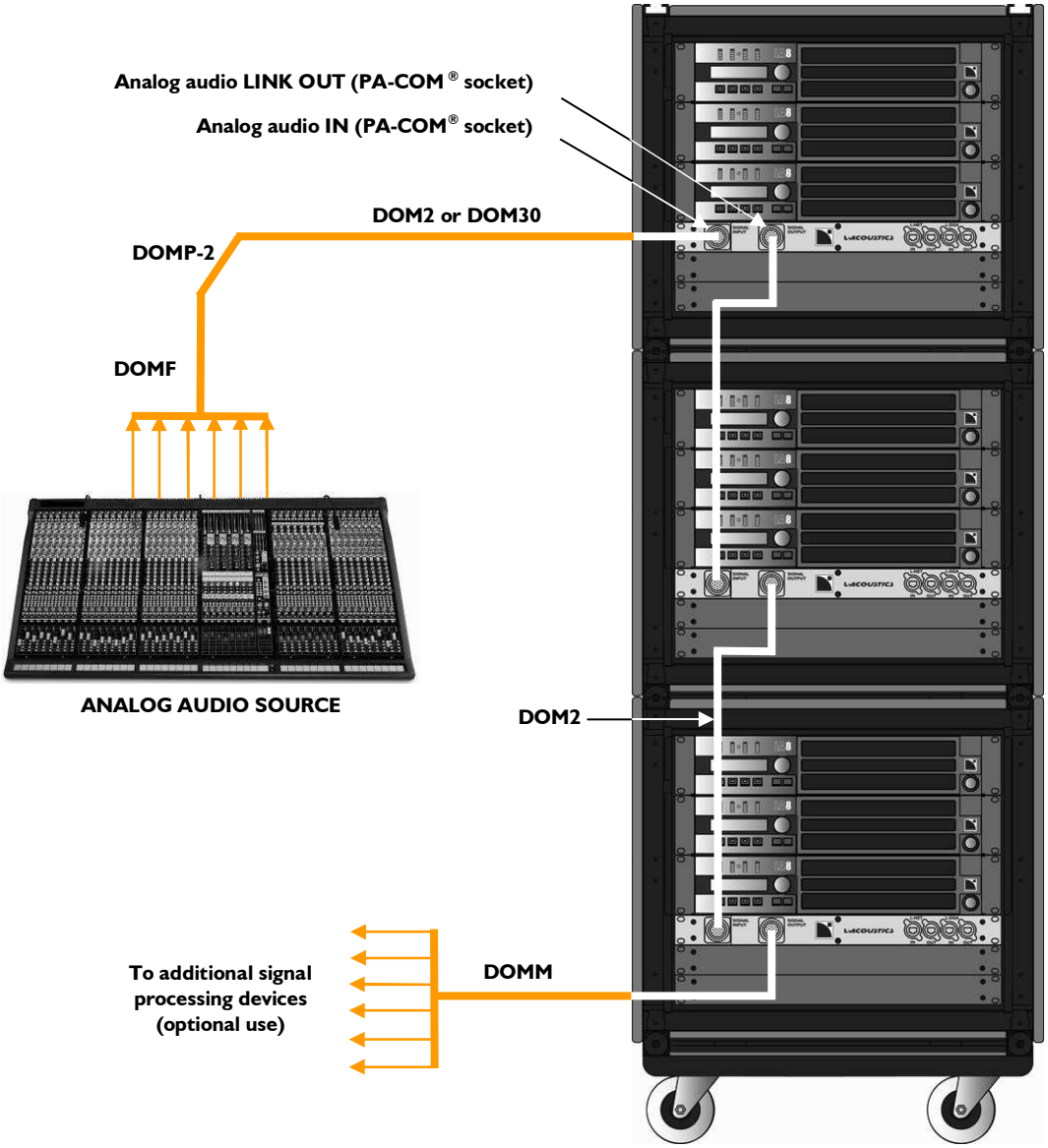


Figure 19: Connecting three LA-RAK to analog audio source

The following chart and figure describe the L-ACOUSTICS® analog audio cables:

Table 1: L-ACOUSTICS® analog audio cable set description

Cable designation	Input connector(s)	Output connector(s)	Length (m / ft)
DOMF	6 x balanced female XLR	PA-COM® female 19-pin with ring	1.5 / 5
DOMM	PA-COM® female 19-pin with ring	6 x balanced male XLR	1.5 / 5
DOM2	PA-COM® female 19-pin with ring	PA-COM® female 19-pin with ring	2 / 6.5
DOM30	PA-COM® female 19-pin with ring	PA-COM® female 19-pin with ring	30 / 100
DOMP-2	PA-COM® male 19-pin	PA-COM® male 19-pin	0.5 / 1.5

DOMF

DOMM

DOM2

DOM30

DOMP-2

Figure 20: The L-ACOUSTICS® analog audio cables

6.6.2 Internal analog audio connection

An **XLR patch panel** located on the rear side of the LA-PANEL and a set of **six XLR cables** allow distributing up to six different analog audio signals (see section 6.6.1) to the LA8 amplified controllers. As the possible internal audio cabling schemes are numerous only two representative ones are shown in Figure 21:

a. One audio signal routed from channel #1 to controller analog inputs. In this case both "LINK" connectors are used to cascade the three LA8 input channels.
Note: In this example only the A channel is physically linked on each LA8 as the A signal can further be internally routed to all four output channels. Use the LA NETWORK MANAGER Matrix function as described in the **"LA NETWORK MANAGER – User Manual"**.

b. Six audio signals respectively routed from channels #1-6 to the six controller analog inputs. In this case only the "INPUT" connectors are used.

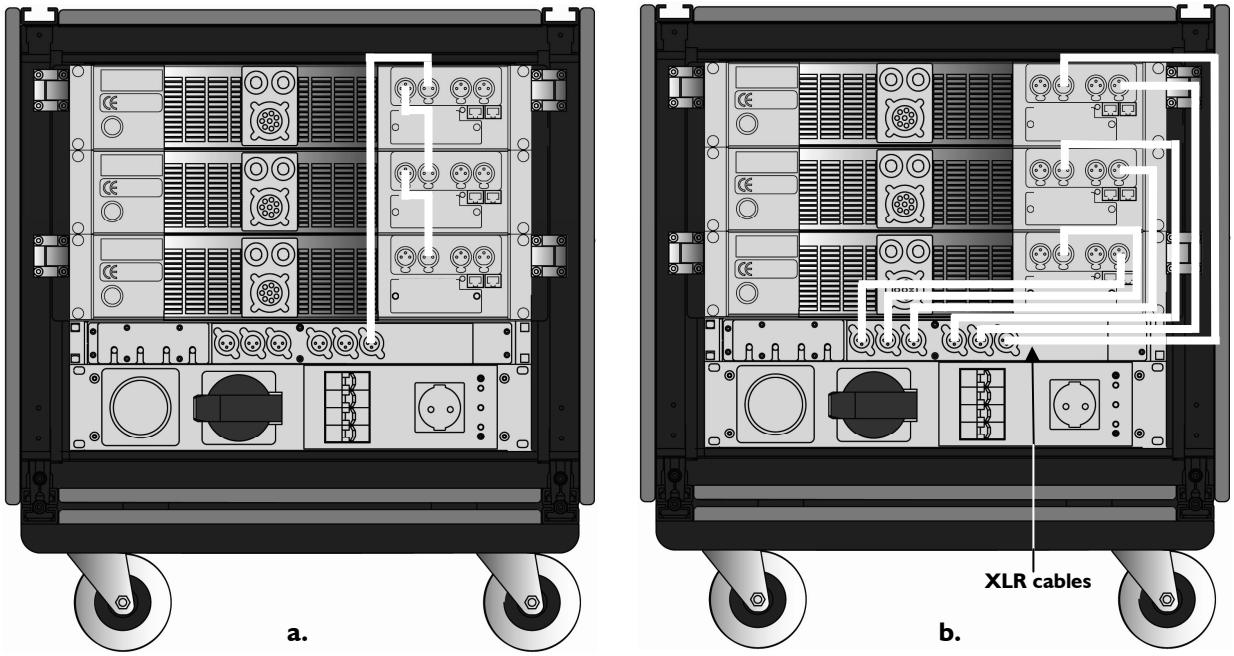


Figure 21: Internal analog audio cabling for (a) 1 or (b) 6 input signals

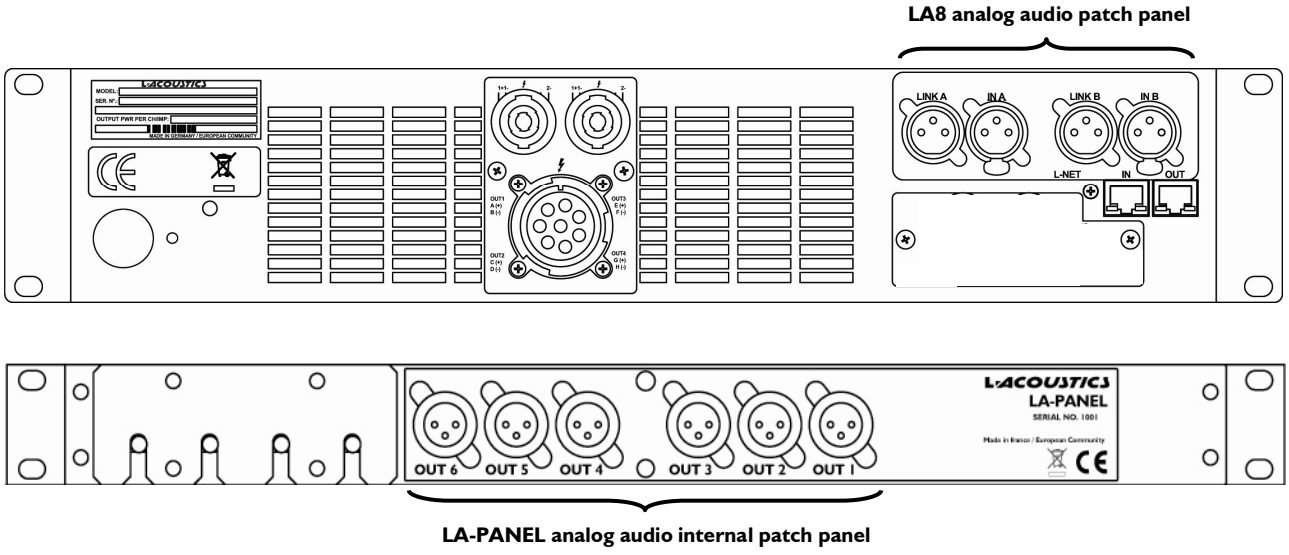


Figure 22: LA8 and LA-PANEL analog patch panels (rear views)

6.7 Connecting LA-RAK to L-NET network

6.7.1 LA-PANEL digital overview

The LA-PANEL is ready to connect to the L-NET network for remote controlling and monitoring the amplified controllers from the LA NETWORK MANAGER software (see the **"LA NETWORK MANAGER – User Manual"** available on the L-ACOUSTICS® web site).

IMPORTANT

The L-DGA digital audio network will be available as a future development. **Please check the L-ACOUSTICS® web site on a regular basis for latest update.**

To connect the L-NET network use CAT5e U/FTP cables (or higher category) fitted with RJ45 connectors.

IMPORTANT

The length of each digital network cable must not exceed 100 m/328 ft.

Multiple digital network topologies such as daisy-chain, star, and hybrid are quickly and easily configurable allowing total flexibility in achieving the required system architecture. The star and hybrid network topologies require the addition of a universal Ethernet® switch.

IMPORTANT

Only connect network devices featuring a minimum speed of 100 Mbps.

6.7.2 External digital connection

The LA-PANEL front side features two L-NET Ethercon® I/O sockets to connect several LA-RAK within the L-NET network (see Figure 23).

IMPORTANT

A maximum of 253 LA8 can be interconnected within the same network (84 LA-RAK + 1 LA8).

Figure 23: LA-PANEL front view

The L-NET connectors located on the LA-PANEL allow connection of the LA-RAK touring racks and the computer (driving LA NETWORK MANAGER software) to the L-NET network. The three following figures show external L-NET cabling principles for the daisy-chain, star, and hybrid network topologies:

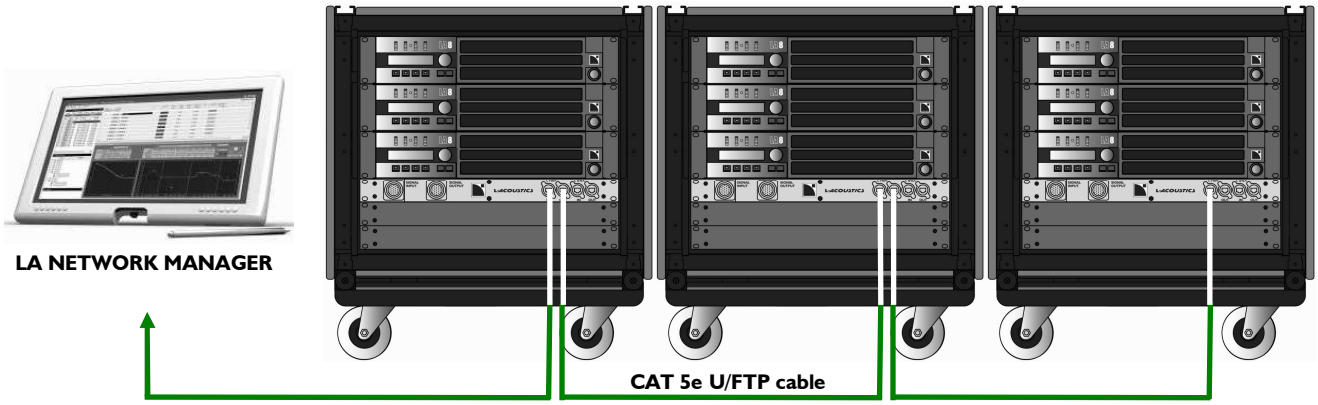


Figure 24: L-NET external cabling – part 1: daisy-chain topology

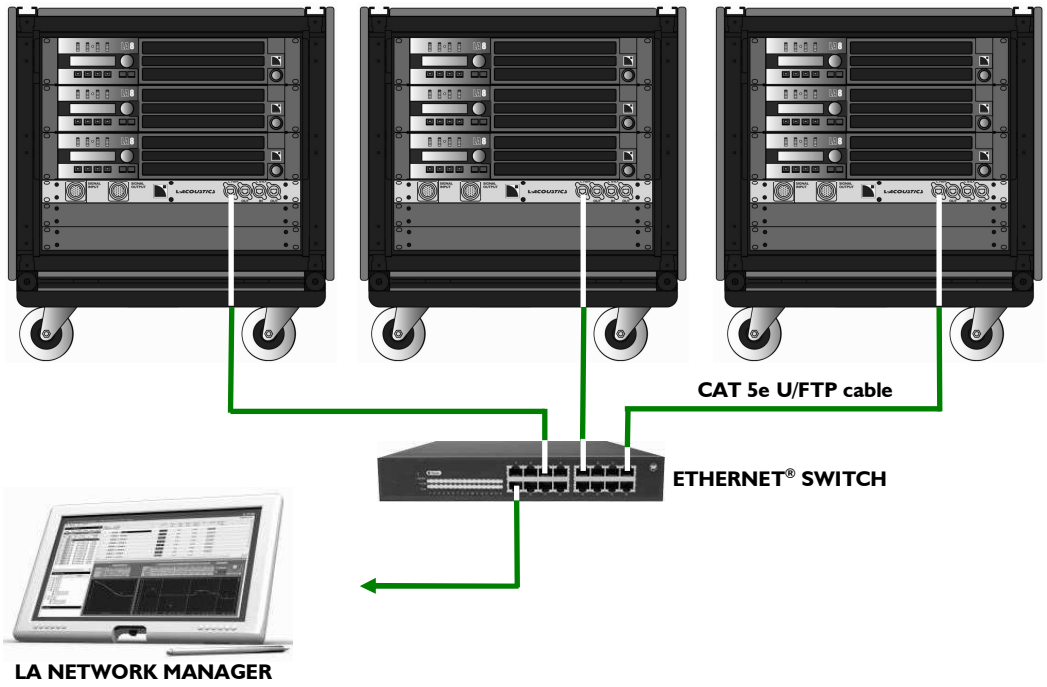


Figure 25: L-NET external cabling – part 2: star topology

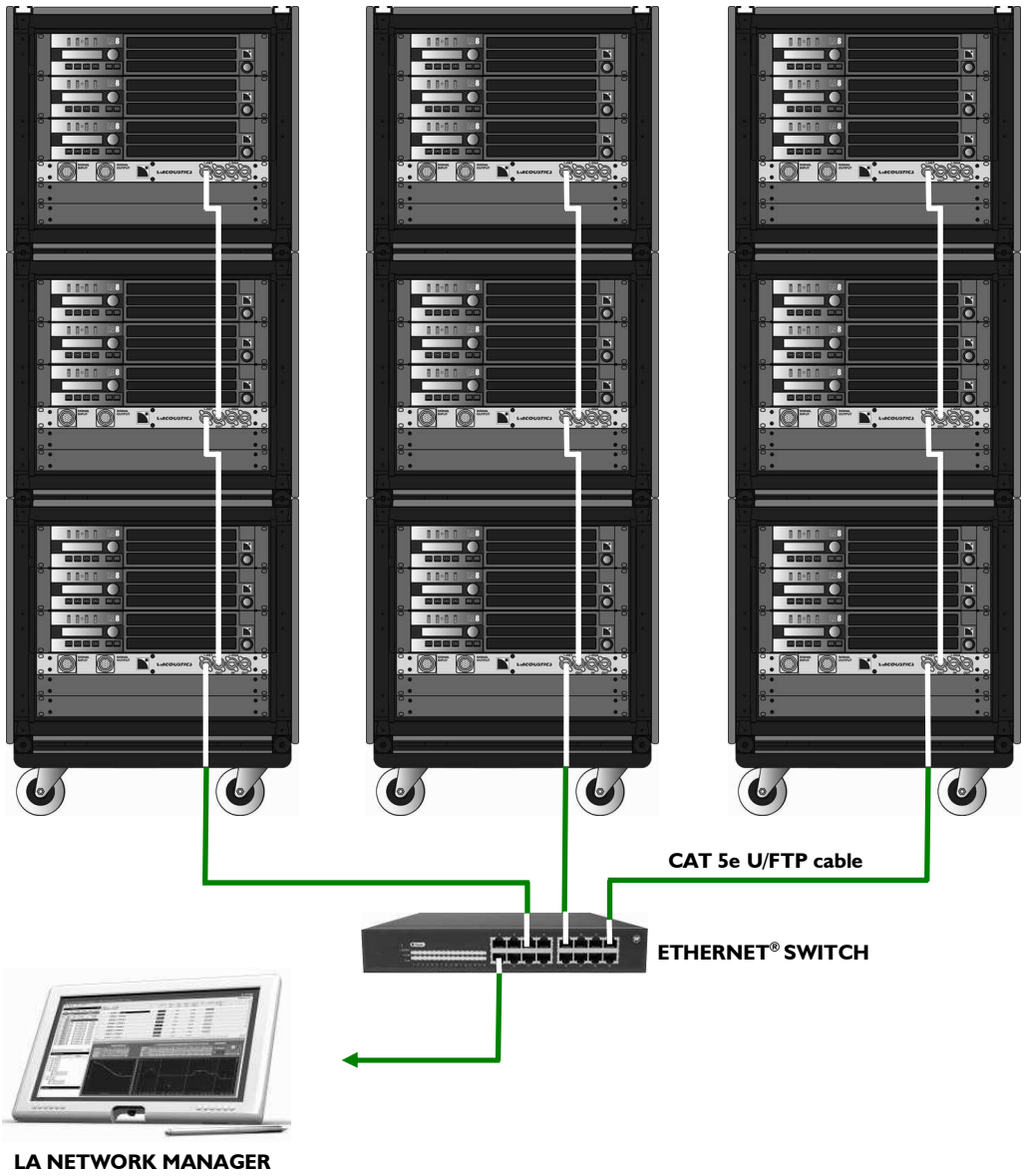


Figure 26: L-NET external cabling – part 3: hybrid topology

6.7.3 Internal digital connection

The LA-PANEL rear side features two L-NET RJ45 I/O sockets with built-in PCB to connect the three LA8 of an LA-RAK to the L-NET network.

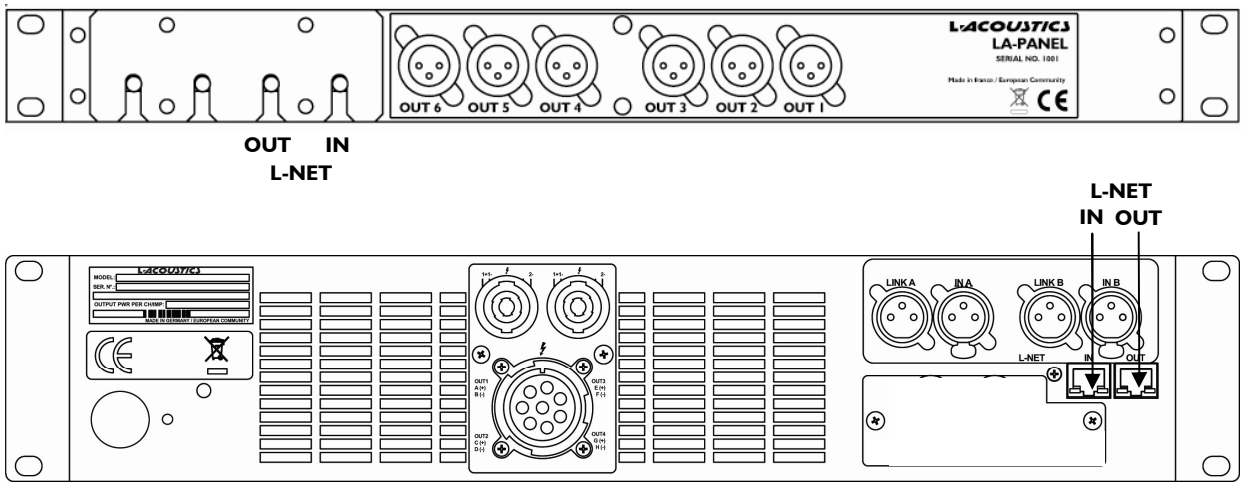
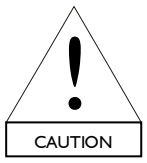


Figure 27: LA-PANEL and LA8 rear views

Cable replacement procedure

When leaving the factory the LA-PANEL features four CAT5e U/FTP cables. If cable replacement is needed follow the procedure below (see also Figure 28):

- **a.** Remove the LA-PANEL from the LA-RAK by removing the four front Pozidriv® screws.
- **b.** Unscrew the back protecting plate by removing the four Torx® screws.
- **c.** Remove the old cables and install new ones.



Check that the connector bodies of the new cables are short enough to allow putting the plate back in place.

- **d.** Put the plate and Torx® screws back in place (torque to 1.5 N.m/14 in.lb_f).
- **e.** Put the LA-PANEL and Pozidriv® screws back in place into the LA-RAK (torque to 3 N.m/27 in.lb_f).

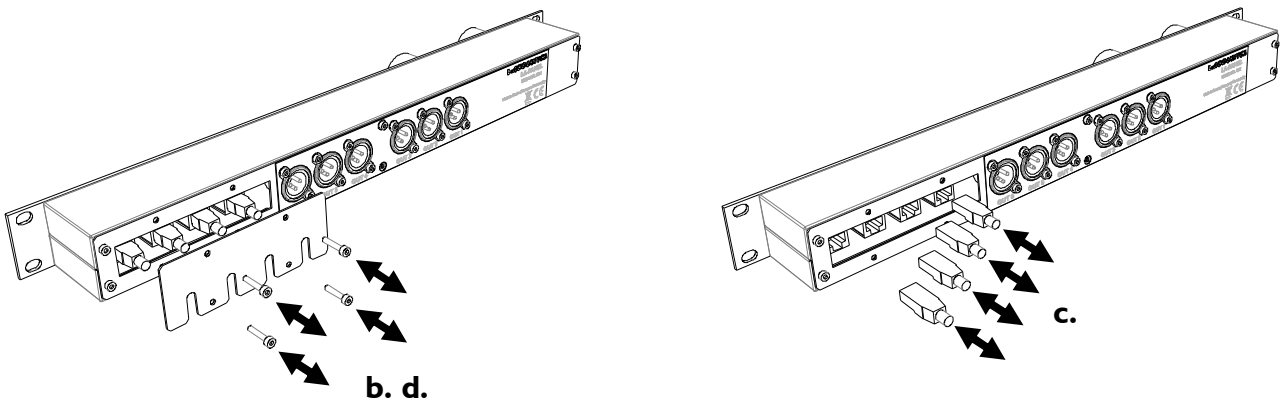


Figure 28: Replacing digital cables on the LA-PANEL rear side

Digital cabling schemes

Both possible internal L-NET cabling schemes are shown in the following figure. The star network topology requires an additional switch (not provided) that can be mounted in the available 2U space located on the LA-RAK:

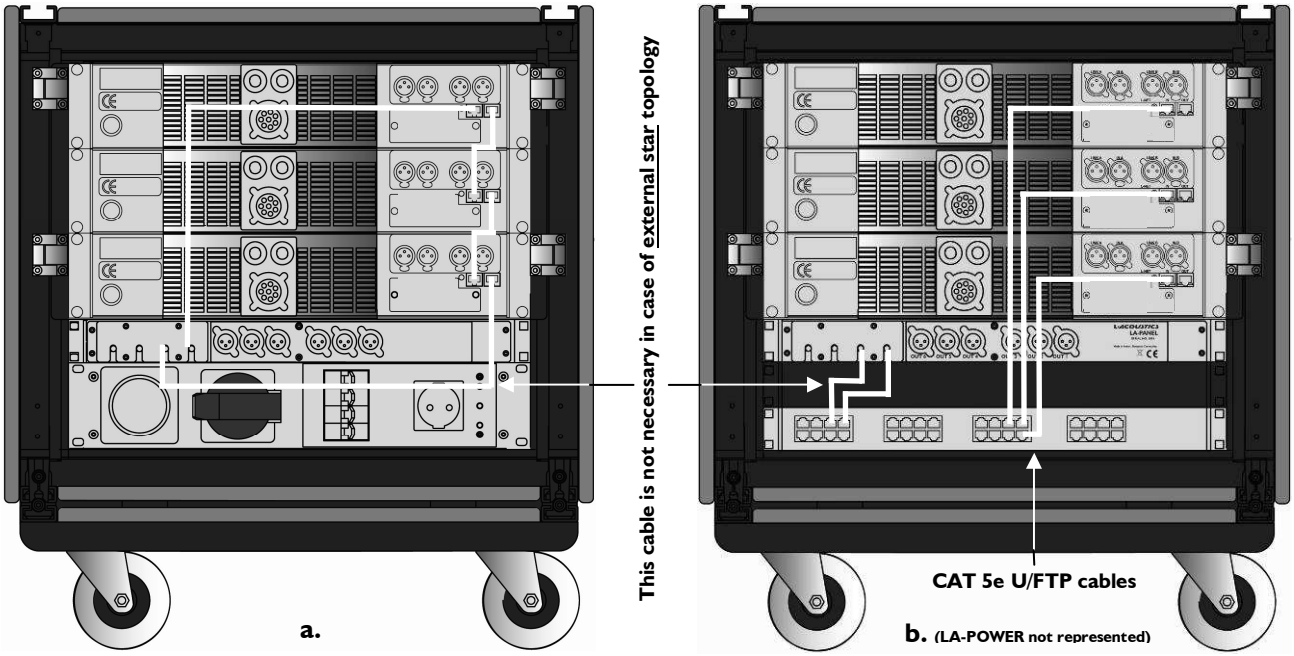


Figure 29: L-NET internal cabling for (a) daisy-chain or (b) star network topologies

Note: The more reliable digital cabling scheme is the external star/internal star one.

6.8 Connecting loudspeakers to LA-RAK

On the LA-RAK rear face the three LA8 central parts contain a set of 3 CA-COM® and 6 Speakon® connectors that offers the same functionality as a speaker output patch panel.

Please refer to appropriate **enclosure User Manuals** as well as **"LA8 - User Manual"** (all available on the L-ACOUSTICS® web site) to connect loudspeakers to LA-RAK.

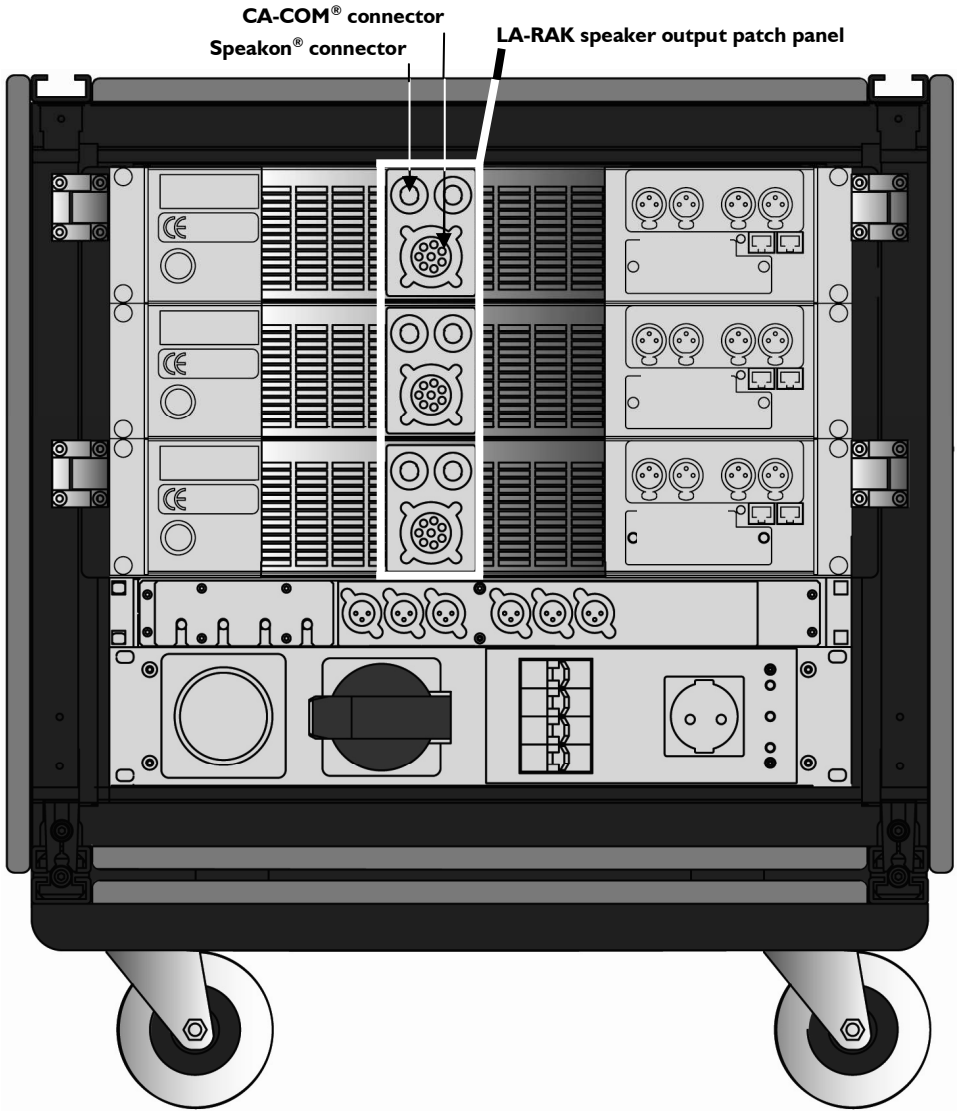


Figure 30: LA-RAK speaker output patch panel

7 CARE AND MAINTENANCE

7.1 Maintenance information

The **L-ACOUSTICS® LA-RAK Touring Rack** is a technical product designed for various, intensive indoor and outdoor sound reinforcement applications. To fulfill such demanding conditions L-ACOUSTICS® has designed the LA-RAK with high-grade and reliable components:

- Aluminum and steel frames, rubber shock mounts.
- Polyethylene sides.
- LEXAN® polycarbonate doors.
- Screws and rigging points resistant to oxidation.

However, in order to ensure product performance and safety, it is essential to frequently inspect the LA-RAK and its internal components. These checks need to be done on a regular basis depending on the conditions of system use. The testing procedure consists of three steps as described in section 7.2.

7.2 Testing procedure

7.2.1 Check of internal components

Check the LA8 amplified controllers as described in the "Care and maintenance" section of the **"LA8 - User Manual"** (available on the L-ACOUSTICS® web site).

Check the quality of contact and locking action of all electrical sockets (PA-COM®, CA-COM®, Speakon®, XLR, Ethercon®, RJ45, as well as power plug and sockets) on the LA8, LA-POWER, and LA-PANEL.

If necessary, contact an L-ACOUSTICS® authorized representative to replace the damaged components.

7.2.2 Mechanical assembly and rigging parts inspection

The assembly and rigging parts of the LA-RAK system are:

- RK 9U internal frames and electric/electronic devices fixed on it, as well as screws and washers.
- RK 9U rigging rails, ball locking pins, rear panels, and LEXAN® doors.
- Dolly board and coupling bars with spring-loaded safeties.
- LA-RAK BUMP including shackles.

The inspection procedure is as follows:

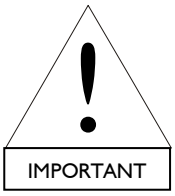
1. Inspect the general aspect of the assembly and rigging parts described above.
2. Check the integrity of mobile and rigging parts (no signs of deformation, indents, or rust).
3. Ensure that the locking mechanism of each spring-loaded safety, ball locking pin, and shackle operates normally.

Any component incorporating a part showing signs of defect must immediately be put aside and withdrawn from use to be inspected by qualified service personnel.

7.3 Spare parts and recommended tools

Table 2: Available spare parts

RK9U	Rack structure including dolly board and two coupling bars
SE PLARK9U	Dolly board
SE RIGRK9U	Coupling bars
MP RK9UPORTE	LEXAN® door
CA RKLOC	LEXAN® door latch
CA RK9UCACHE	1U blank panel
RKENTR	Spacer to fix the LA8 rear part to the LA-RAK
LA8 / LA8 US / LA8 JP	Amplified controller 4 x 1800 W @ 4 Ω for Europe / USA / Japan
LAPANEL	LA-PANEL signal distribution panel
SE CHPRK9U10	1 m/3 ft XLR cable
SE CHPRK9U03	0.35 m/1 ft XLR cable
CP RK9UETH1	1 m/3 ft CAT5e U/FTP cable
CP RK9UETH2	0.3 m/1 ft CAT5e U/FTP cable
LAPOWER	LA-POWER power distribution panel
LARAKBUMP	LA-RAK BUMP rigging frame
CA MAN19L	⅝" shackle



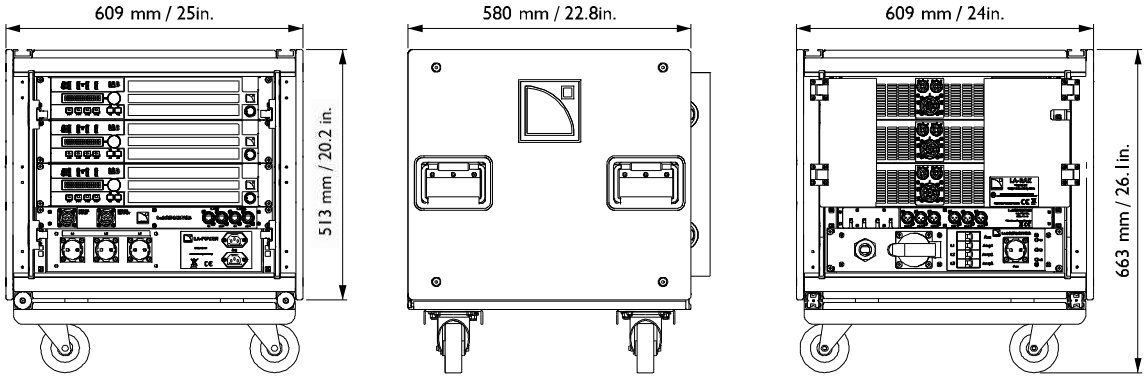
- In Europe use the LA-POWER device (230 V version) presented all along this manual.
- In USA use the LA-POWER US device (120 V version) presented in Appendix 9.
- In any other country contact a local L-ACOUSTICS® distributor.

Table 3: Recommended tools for service

Torque wrench (N.m or in.lb_f)
PZ.3 Pozidriv® screwdriver
T10 Torx® screwdriver

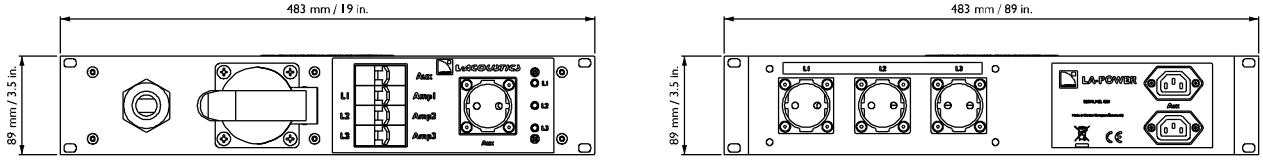
8 SPECIFICATIONS

Reference	**RK 9U**
Dimensions (W x H x D)	609 x 513 x 580 mm / 25 x 20.2 x 22.8 in
H including dolly board	663 mm / 26.1 in



Weight	95 kg / 209 lbs (fully equipped + dolly board)
Vertically flying	⇨ Captive rigging components. Certified for up to 4 LA-RAK underneath the L-ACOUSTICS® LA-RAK BUMP flying frame (available separately). ⇨ Certified for up to 4 LA-RAK onto the L-ACOUSTICS® K1-BUMP flying frame (available with the K1 system, refer to the **"K1 – Rigging Procedures"** manual).
Vertically stacking or shipping	⇨ Captive rigging components. Certified for up to 3 LA-RAK onto the dolly board.
External Structure	
Materials	Polyethylene, aluminum, and steel.
Finish	Grayish-brown, RAL 8019®.
Doors	LEXAN® polycarbonate.
Rigging components	Polyester-coated steel.
Handles	Integrated into the cabinet.
Complementary accessories	1 x dolly board, 2 x coupling bars.

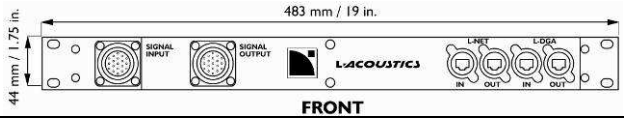
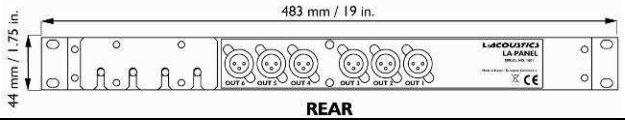
Reference	**LA-POWER** [1]
Dimensions (W x H x D)	483 x 89 (2U) x 103 mm / 19 x 3.5 (2U) x 4 in

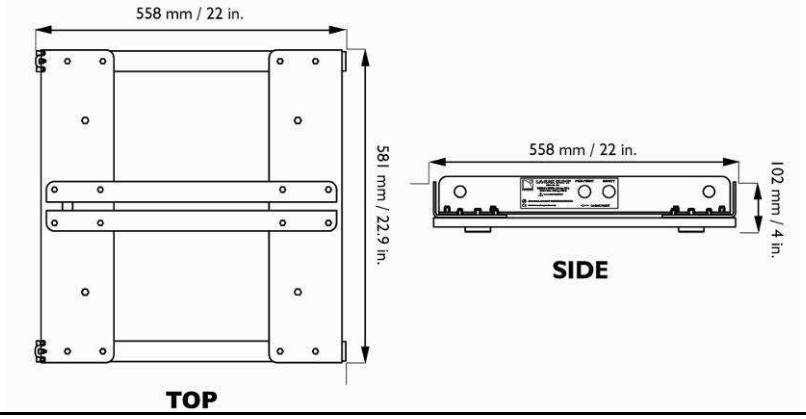


Front **Rear**

Weight	4 kg / 8.8 lbs
AC input	Front: 32 A – P17 (3P+N+G) male plug + power cord.
AC outputs	Front: LINK OUT 32 A – P17 (3P+N+G) female socket. 1 x type F "Shuko" socket (Auxiliary). Rear: 3 x type F "Shuko" sockets (L1, L2, L3). 2 x type IEC CEE22 sockets (Auxiliary).
Protection	3 x 16 A type C circuit breakers (L1, L2, L3). 1 x 10 A type C circuit breaker (Auxiliary).

[1] European standard. See applicable documentation for other countries.

Reference	LA-PANEL
Dimensions (W x H x D)	483 x 44 (1U) x 59 mm / 19 x 1.75 (1U) x 2.3 in
	 FRONT  REAR
Analog input	Front: 1 x PACOM® 19-pin socket.
Analog outputs	Front: 1 x LINK OUT PACOM® 19-pin socket. Rear: 6 x male XLR 3-pin sockets.
L-NET I/O	Front: 2 x Ethercon® sockets. Rear: 2 x RJ45 sockets with built in PCB.
L-DGA I/O	Front: 2 x Ethercon® sockets. Rear: 2 x RJ45 sockets with built in PCB.
Complementary accessories	6 x XLR 1 m/3 ft labeled cables, 2 x XLR 0.35 m/1 ft bridge cables. 4 x CAT5e U/FTP 1 m/3 ft labeled cables, 2 x CAT5e U/FTP 0.3 m/1 ft bridge cables. Ethernet® switch (not provided, only for star network topology).

Reference	LA-RAK BUMP
Dimensions (W x H x D)	581 x 102 x 558 mm / 22.9 x 4 x 22 in
	
Weight	13.5 kg / 29.7 lbs
Setup safety limits	Maximum of 4 LA-RAK per LA-RAK BUMP.
Material	Polyester-coated steel.
Complementary accessory	2 x ⅝” shackles

9 APPENDIX: CONNECTING THE LA-POWER US

9.1 LA-RAK and LA-POWER US presentation

A 120 V version of the LA-RAK touring rack is also available for use in the USA. It features the same characteristics as the European version except for the mains power block as referenced as the LA-POWER US.

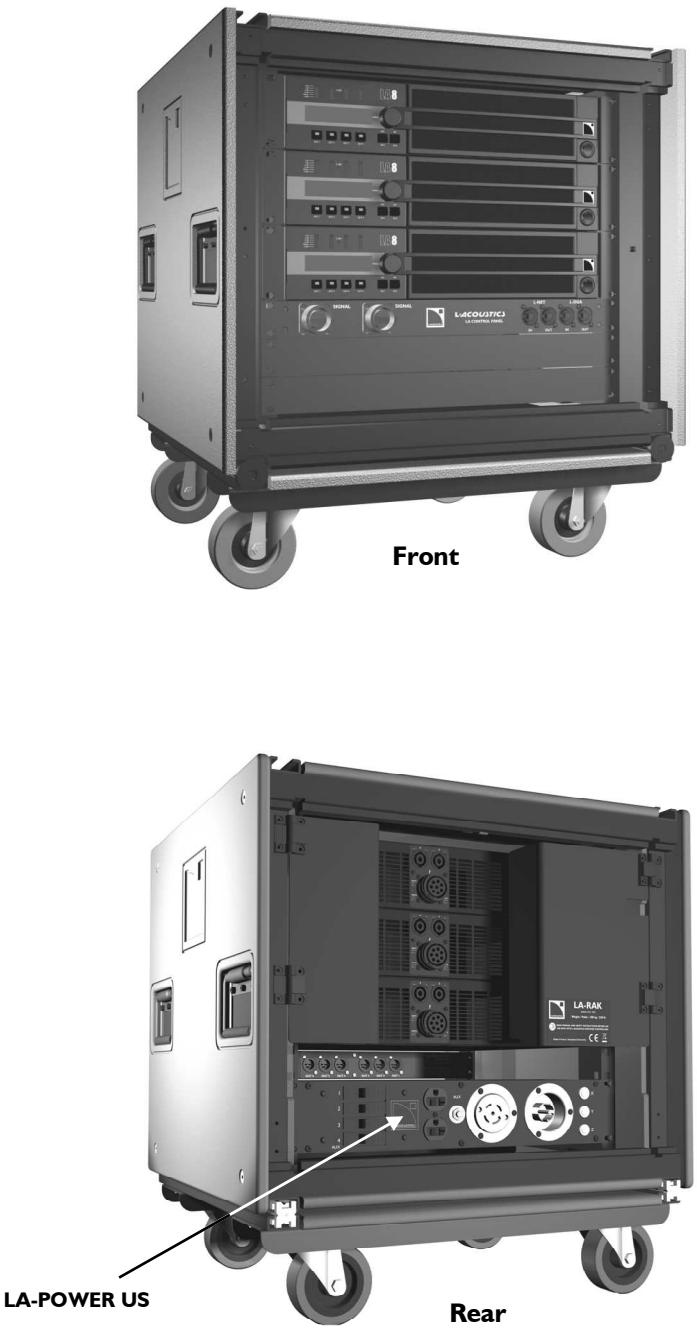


Figure 31: Equipped LA-RAK for USA

The **L-ACOUSTICS® LA-POWER US** is a 2U/19" I/O 120 V power distribution panel featuring a 30 A three-phase L-21 IN/THRU socket. This configuration allows the power to be automatically balanced with one LA8 per phase.

Three L5-30 AC outlets (L1, L2, and L3) are available for LA8 and six additional duplex outlets (2 front and 4 rear) are to power auxiliary accessories such as Ethernet® switches, portable computer, and the like. All circuits are protected by discrete breakers and three LED help monitor phase presence.

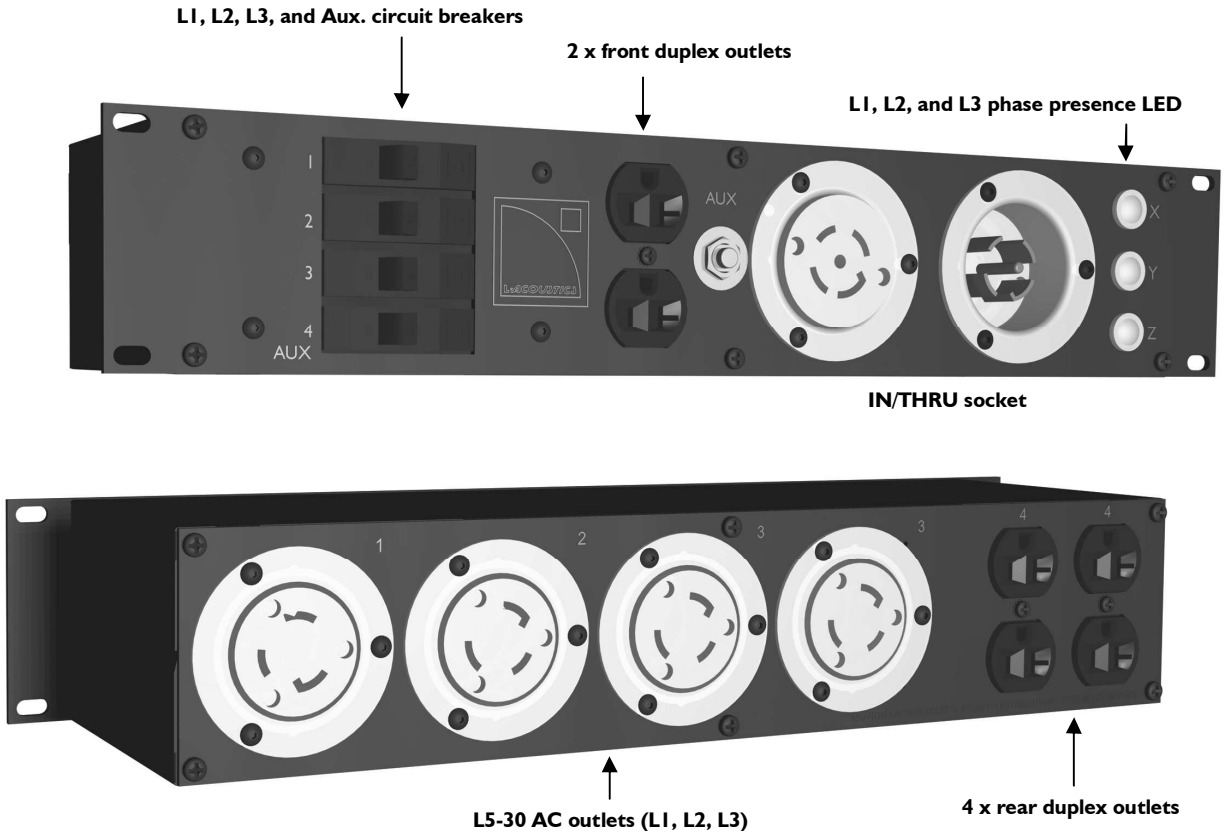
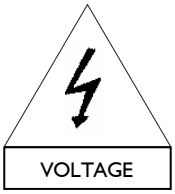


Figure 32: The LA-POWER US

9.2 Connecting LA-RAK US to AC mains

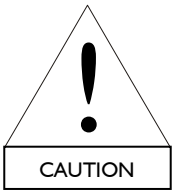
9.2.1 LA-POWER US three-phase circuit

The LA-POWER US connects to **120 V (±10 %) / 30 A three-phase AC mains** using the male L-21 IN plug.



The LA-POWER US only connects to three-phase AC mains rated 120 V (±10 %) / 30 A, 50 - 60 Hz.

Contact a local L-ACOUSTICS® distributor for countries in which this standard does not apply.



A maximum of one LA-RAK can be connected per AC mains outlet.

Never use the female L-21 THRU socket.

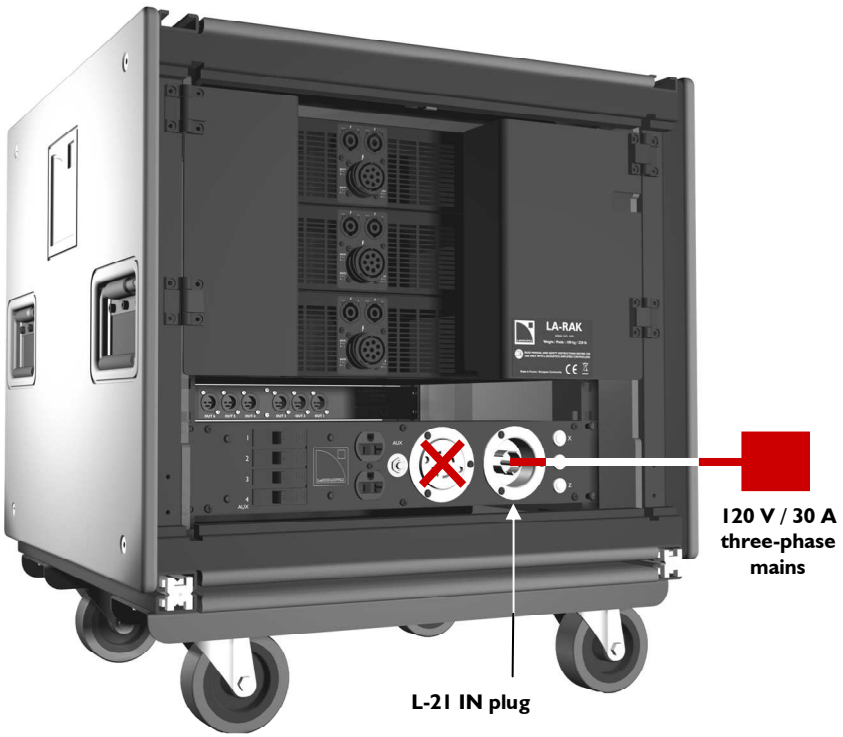
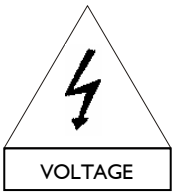


Figure 33: Connection of the LA-RAK US to AC mains

9.2.2 LA-POWER US mono-phase circuits



Connect LA-RAK US to AC mains **only if** the operating voltage indicated on the LA8 back panels corresponds to the local AC mains rating.

Two LA8 versions are available (also refer to the **"LA8 – User Manual"**):

- A universal 120/230 V (±10 %) version fitted with automatic switch mode power supply.
- A specific 100 V (±10 %) version for Japan.

The LA-POWER US three-phase circuit described in the above section powers the three mono-phase circuits corresponding to the three L5-30 female outlets located on the rear face (L1, L2, and L3). These last allow connection of the three LA8 amplified controllers mounted in the LA-RAK US (see Figure 34).

Each outlet is protected by a **30 A** circuit breaker located on the front face and three LED help monitor the presence of each phase on the front end of the mains circuit.

The LA-POWER US also includes an **auxiliary circuit** protected by the "Aux" **20 A** circuit breaker. This circuit powers six duplex outlets located on the front and rear faces to connect portable computer and the like as well as additional Ethernet® switches.

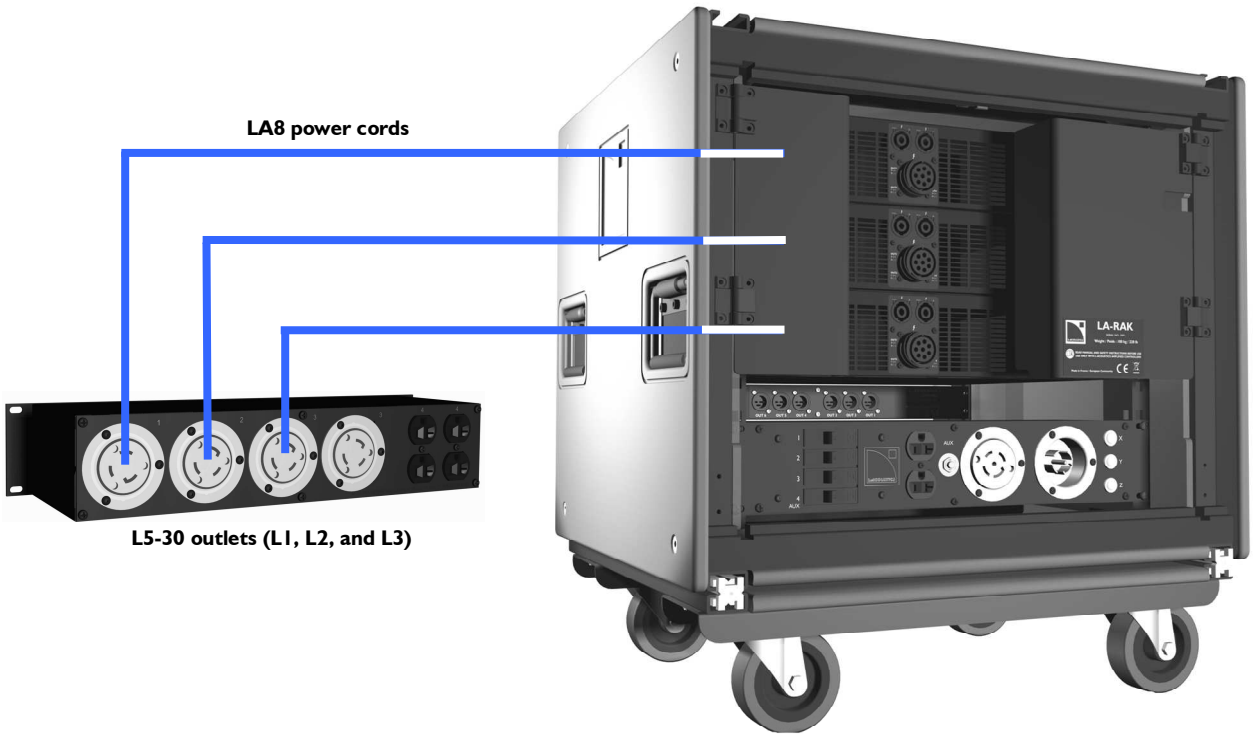


Figure 34: Powering three LA8 within an LA-RAK (LA-POWER external rear view)

Document Reference: LARAK_UM_EN_1.0

Distribution date: July 20th, 2009