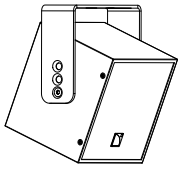
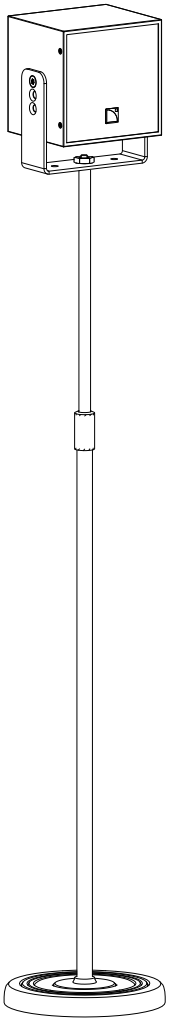
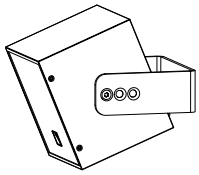
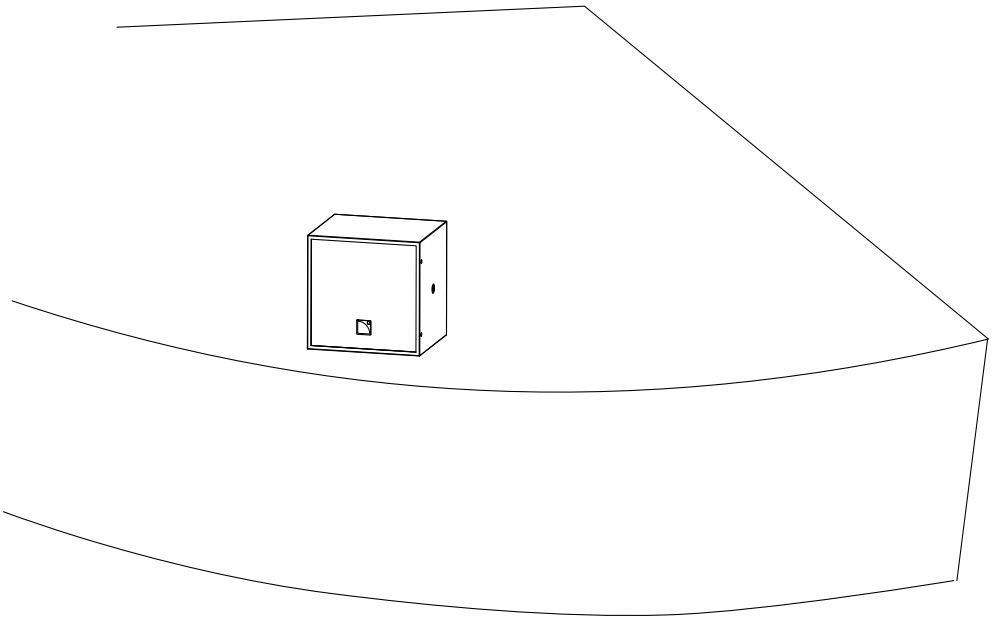
X4i

owner's manual (EN)









Document reference: X4i owner's manual (EN) version 3.0
Distribution date: July 7, 2020

Contents

Safety

Instructions

Inspect the system before any deployment.

Perform safety related checks and inspections before any deployment.

Perform preventive maintenance at least once a year.

Refer to the preventive maintenance section for a list of actions and their periodicity.

Insufficient upkeep of the product can void the warranty.

If any safety issue is detected during inspection, do not use the product before performing corrective maintenance.

Check for issues. A rigging system part or fastener is missing or loose. A rigging system part exhibits: bends, breaks, broken parts, corrosion, cracks, cracks in welded joints, deformation, denting, wear, holes. A safety cue or label is missing. A loose part is not adequately secured.

Never incorporate equipment or accessories not approved by L-Acoustics.

Read all the related PRODUCT INFORMATION documents shipped with the products before exploiting the system.

Do not store the product on an unstable cart, stand, tripod, bracket, or table.

Beware of sound levels.

Do not stay within close proximity of loudspeakers in operation.

Loudspeaker systems are capable of producing very high sound pressure levels (SPL) which can instantaneously lead to permanent hearing damage to performers, production crew and audience members. Hearing damage can also occur at moderate level with prolonged exposure to sound.

Check the applicable laws and regulations relating to maximum sound levels and exposure times.

Work with qualified personnel for rigging the system

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

Ensure personnel health and safety

During installation and set-up personnel must wear protective headgear and footwear at all times. Under no circumstances is personnel allowed to climb on a loudspeaker assembly.

Respect the Working Load Limit (WLL) of third party equipment.

L-Acoustics is not responsible for any rigging equipment and accessories provided by third party manufacturers.

Verify that the Working Load Limit (WLL) of the suspension points, chain hoists and all additional hardware rigging accessories is respected.

Respect the maximum configurations and the recommended safety precautions.

For safety issue, respect the maximum configurations outlined in this manual. To check the conformity of any configuration in regards with the safety precautions recommended by L-Acoustics, model the system in Soundvision and refer to the warnings in Mechanical Data section.

Be cautious when flying a loudspeaker configuration.

Before installing/raising the product, check each individual element to make sure that it is securely fastened to the adjacent element. Always verify that no one is standing underneath the product when it is being installed/raised. Never leave the product unattended during the installation process.

As a general rule, L-Acoustics recommends the use of secondary safety at all times.

Be cautious when ground-stacking a loudspeaker array.

Do not stack the loudspeaker array on unstable ground or surface. If the array is stacked on a structure, platform, or stage, always check that the latter can support the total weight of the array.

As a general rule, L-Acoustics recommends the use of safety straps at all times.

Risk of falling objects

Verify that no unattached items remain on the product or assembly.

Risk of tipping

Remove all rigging accessories before transporting a product or an assembly.

Take into account the wind effects on dynamic load.

When a loudspeaker assembly is deployed in an open air environment, wind can produce dynamic stress to the rigging components and suspension points.

If the wind force exceeds 6 bft (Beaufort scale), lower down and/or secure the product or the assembly.

Intended use

This system is intended for use by trained personnel for professional applications.

As part of a continuous evolution of techniques and standards, L-Acoustics reserves the right to change the specifications of its products and the content of its documents without prior notice.

Check www.l-acoustics.com on a regular basis to download the latest document and software updates.

Do not expose the product to extreme conditions.

Do not expose the product to moisture (rain, mist, sea spray, steam, humidity, condensation…) or excessive heat (direct sun, radiator…) for a long period of time.

For more information, refer to the **Product protection ratings** document, available on the website.

Read the maintenance section of this document before servicing the product.

Contact L-Acoustics for advanced maintenance.

Any unauthorized maintenance operation will void the product warranty.

Symbols

The following symbols are used in this document:

This symbol indicates a potential risk of harm to an individual or damage to the product.

It can also notify the user about instructions that must be strictly followed to ensure safe installation or operation of the product.

This symbol notifies the user about instructions that must be strictly followed to ensure proper installation or operation of the product.

This symbol notifies the user about complementary information or optional instructions.

Introduction

How to use this manual

The X4i owner's manual is intended for all actors involved in the system design, implementation, preventive and corrective maintenance of the X4i system. It must be used as follows:

1. Read the technical description for an overview of all system elements, their features, and their compatibilities.
   - Electro-acoustical description (p.10)
   - Rigging system description (p.12)
2. Prepare the system configuration. Consider the mechanical limits and the available acoustical configurations.
   - Mechanical safety (p.15)
   - Loudspeaker configurations (p.16)
3. Before rigging the system, perform mandatory inspections and functional checks.
   - Inspection and preventive maintenance (p.18)
4. To deploy the system, follow the step-by-step rigging instructions and refer to the cabling schemes.
   - Rigging procedures (p.23)
   - Connection to LA amplified controllers (p.27)

The Corrective maintenance (p.29) section contains the operations authorized for the end user.
Performing another operation exposes to hazardous situations.
For advanced maintenance, contact your L-Acoustics representative.

As part of a continuous evolution of techniques and standards, L-Acoustics reserves the right to change the specifications of its products and the content of its document without prior notice. Please check www.l-acoustics.com on a regular basis to download the latest document and software updates.

Contact information

For information on advanced corrective maintenance:
- contact your Certified Provider or your L-Acoustics representative
- for Certified Providers, contact the L-Acoustics customer service: customer.service@l-acoustics.com

X4i miniature enclosure

X4i is an installation-specific miniature coaxial system designed for short throw applications requiring seamless integration in the smallest spaces.

X4i features a 1.4" diaphragm compression driver coaxially loaded by a 4" neodymium low-mid frequency transducer mounted in a closed cabinet. X4i operates from 120 Hz to 20 kHz and delivers a peak SPL of 116 dB. The coaxial transducer arrangement produces a 110° axisymmetric directivity with a smooth tonal response free of secondary lobes over the entire frequency range.

The internal passive crossover network uses custom filters. The L-Acoustics amplified controllers L-Drive parameters ensure the linearization and protection of the transducers.

System components

Loudspeaker enclosures

X4i	2-way passive coaxial enclosure: 4'' LF + 1.4'' HF diaphragm
Syva Sub	Infra low frequency subwoofer: 1 x 12'' LF

Refer to the Syva user documentation for information on using Syva Sub.

Powering and driving system

LA2Xi / LA4X / LA8 / LA12X	Amplified controller with DSP, preset library and networking capabilities

Refer to the LA2Xi / LA4X / LA8 / LA12X owner's manual for operating instructions.

Loudspeaker cables

SP cables	4-point speakON loudspeaker cables (4 mm^2 gauge)
	SP cables come in four sizes: SP.7 (0.7 m/2.3 ft), SP5 (5 m/16.4 ft), SP10 (10 m/32.8 ft) and SP25 (25 m/82 ft)
SP-Y1	breakout cable for two passive enclosures (2.5 mm^2 gauge) provided with a CC4FP adapter
	4-point speakON to 2 × 2-point speakON
speaker cable	2.5 mm^2 cable
	Speaker cable used to connect enclosures in parallel. Adapt the cable length to the installation.
custom 2-point speakON cable	2-point speakON cable (2.5 mm^2 gauge) to bare wire cable
	This cable needs to be custom made.

Information about the connection of the enclosures to the LA amplified controllers is given in this document.

Refer to the LA2Xi / LA4X / LA8 / LA12X owner's manual for detailed instructions about the whole cabling scheme, including modulation cables and network.

Rigging elements

X-U4i	Adjustable U-bracket for X4i

Transportation accessories

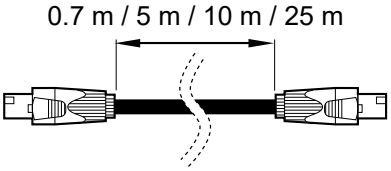
L-Case	2U Electronics transport and protection case

Software applications

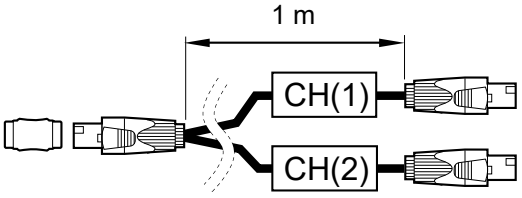
Soundvision	3D acoustical and mechanical modeling software
LA Network Manager	Software for remote control and monitoring of amplified controllers

Refer to the **Soundvision** help.
Refer to the **LA Network Manager** help.

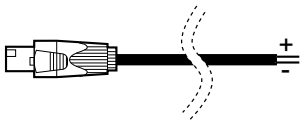
Loudspeaker cables



SP.7 / SP5 / SP10 / SP25



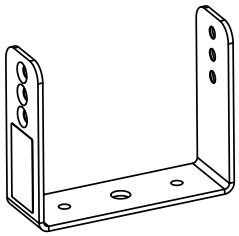
SP-Y1



2-point speakON cable (2.5 mm^2 gauge) to bare wire cable

This cable needs to be custom made.

Rigging elements

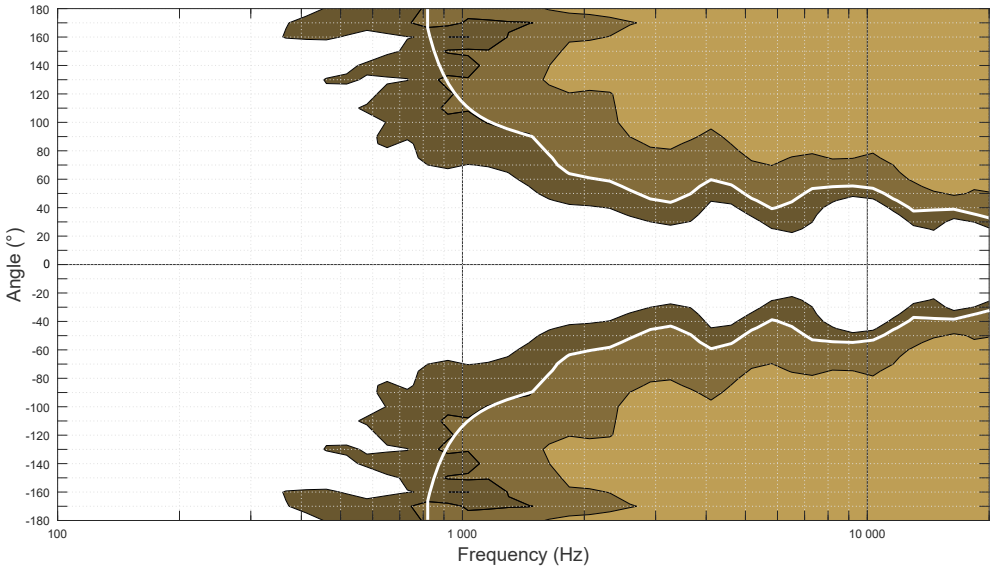


X-U4i

Electro-acoustical description

Directivity

X4i generates an axisymmetrical directivity pattern of 110°.



Dispersion angle diagram of a single enclosure, using lines of equal sound pressure at -3 dB, -6 dB, -12 dB.

Preset description

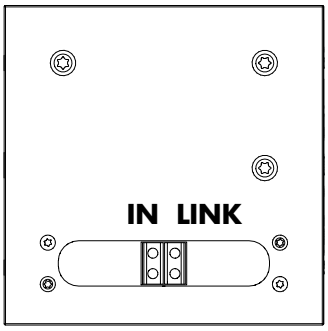
[X4]

outputs	channels	routing	gain	delay	polarity	mute
OUT 1	PA	IN A	0 dB	0 ms	+	ON
OUT 2	PA	IN A	0 dB	0 ms	+	ON
OUT 3	PA	IN B	0 dB	0 ms	+	ON
OUT 4	PA	IN B	0 dB	0 ms	+	ON

[SYVA SUB_200]

outputs	channels	routing	gain	delay	polarity	mute
OUT 1	SB	IN A	0 dB	0 ms	+	ON
OUT 2	SB	IN A	0 dB	0 ms	+	ON
OUT 3	SB	IN A	0 dB	0 ms	+	ON
OUT 4	SB	IN A	0 dB	0 ms	+	ON

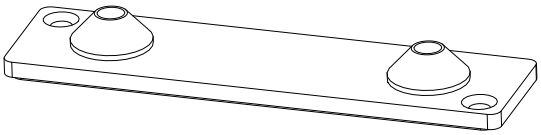
Connectors



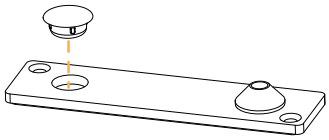
X4i

2 × 2-point screw terminal

X4i is provided with a connector sealing plate with two cable glands for 2.5 mm^2 cables.

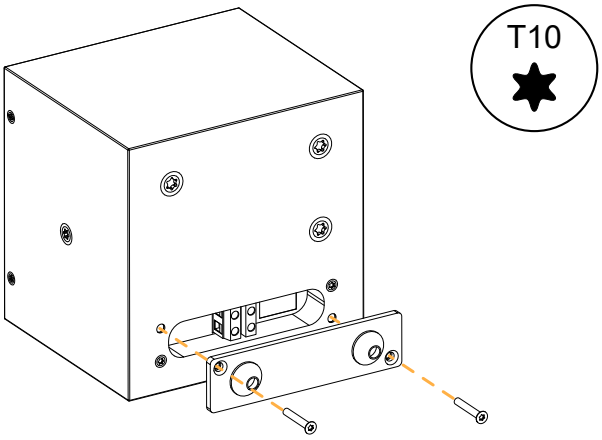


If only one connector is used, replace one cable gland with the protective plug.



Pass the cables through the cable glands before connecting them to the screw terminals.

Secure the connector sealing plate to protect the connectors.



Internal pinout for L-Acoustics 2-way passive enclosures

screw terminal points	IN +	IN -
Transducer connectors	+	-

Rigging system description

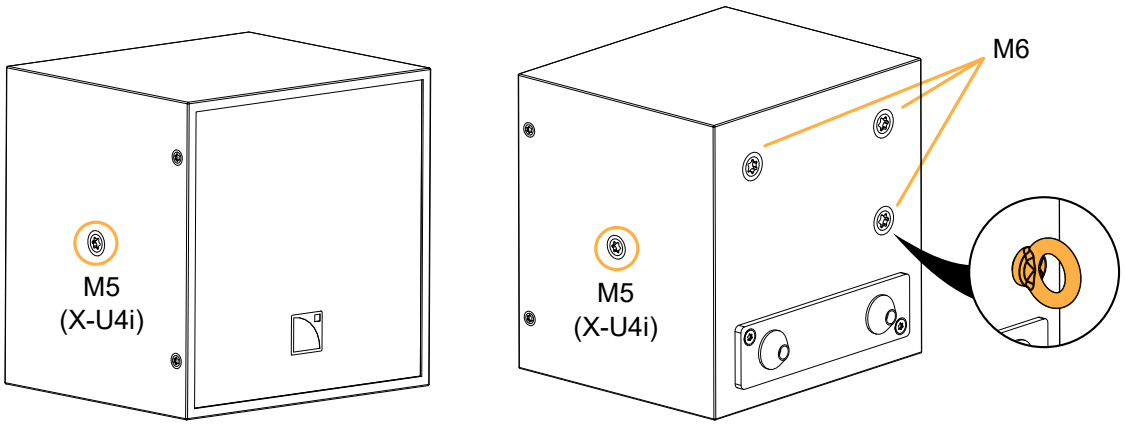
X4i

X4i features one M5 insert and screw on each side to connect X-U4i.

Three M6 inserts and screws at the back of X4i are available for compatible rigging accessories.

Secondary safety for flown enclosures

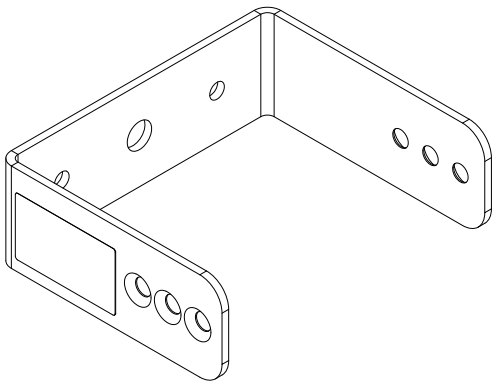
Use one insert at the back of the enclosure to implement a secondary safety.



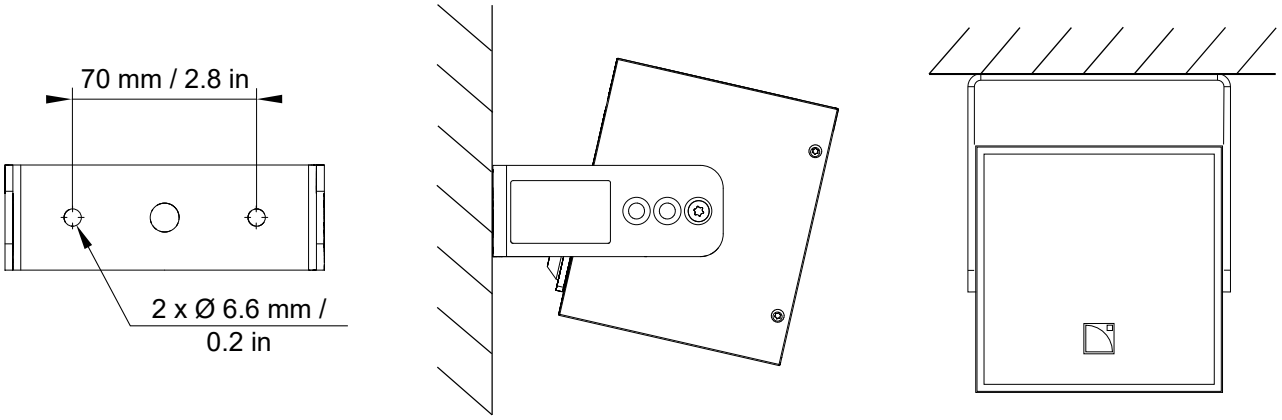
Always put the screws back into place to avoid leaks.

X-U4i

X-U4i is a U-bracket compatible with X4i.



It can be used to mount one X4i on the wall or under the ceiling, with site angle adjustment.

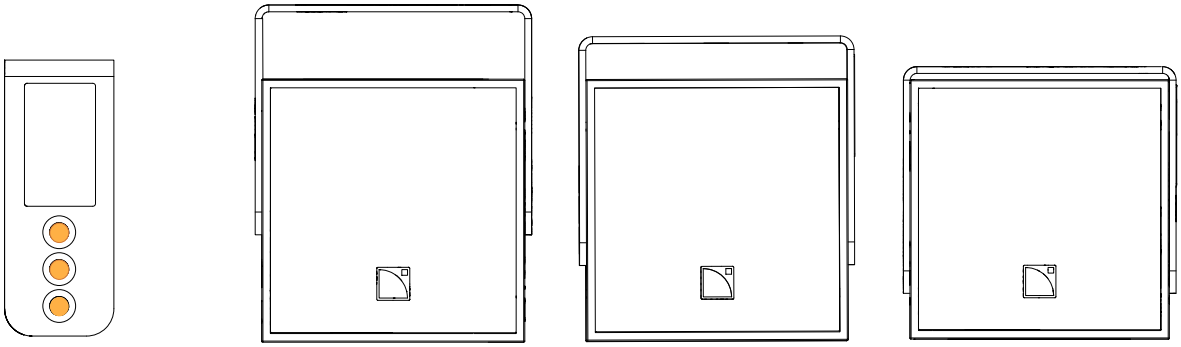


Fasteners for wall-mounting or ceiling-mounting

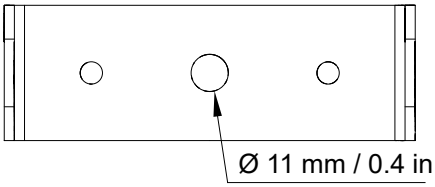
Secure the bracket with two M6 screws.

Select screw length and anchors applicable to the wall or ceiling properties.

X-U4i features three holes on both sides to closely fit the enclosure and to optimize visual impact.



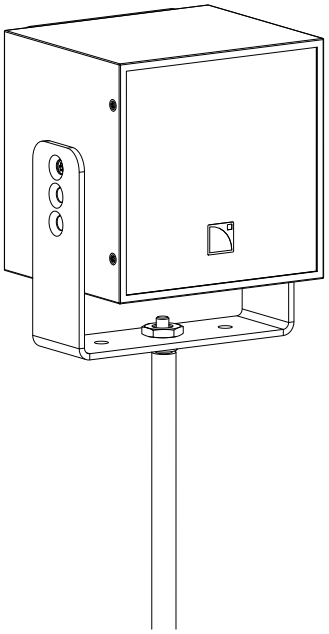
X-U4i features a Ø 11 mm insert dedicated to pole-mounting.



The U-bracket can be fitted to a microphone stand with a Ø 10 mm threaded axis (European standard) and the matching locking ring.

Adapter for US microphone stand

Use a 3/8"-16 male to 5/8"-27 female microphone screw adapter and a locking ring to mount X4i on a US standard microphone stand.



Mechanical safety

The X4i rigging system complies with EN 62368-1: 2014 Audio/video, information and communication technology equipment — Part 1: Safety requirements.

The deployments described in this manual achieve a safety factor of **5**.

X4i

configuration	rigging accessory	maximum / safe limit
wall-mounted / ceiling-mounted	X-U4i	1
pole-mounted	X-U4i + microphone stand (European standard)	1

Secondary safety for flown enclosures
Use one insert at the back of the enclosure to implement a secondary safety.

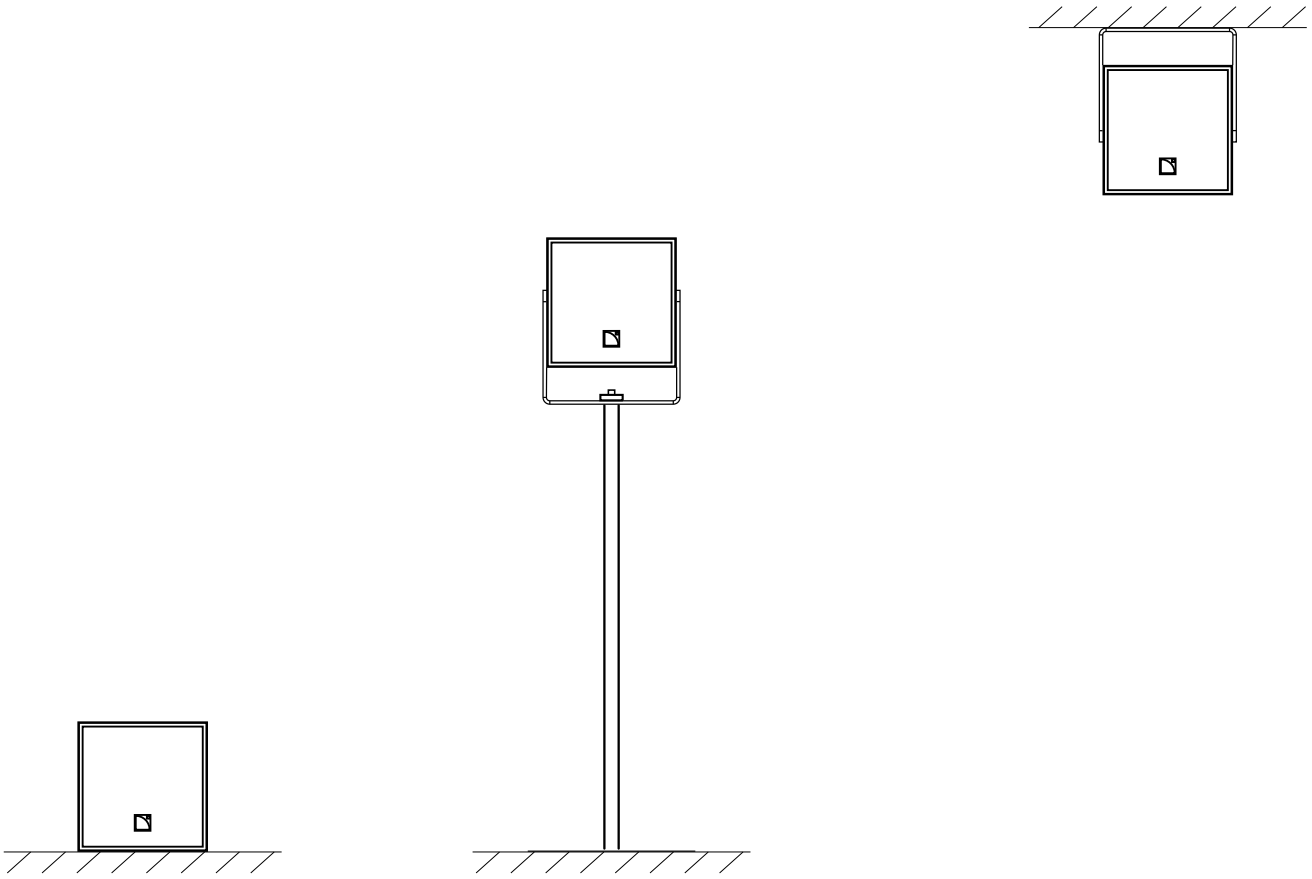
Loudspeaker configurations

X4i point source

In this configuration, the X4i system operates over the nominal frequency range of the enclosure.

The [X4] preset delivers a reference frequency response in short throw applications.

X4i is driven by the LA2Xi / LA4X / LA8 / LA12X amplified controllers.



Enclosure	X4i
Preset	[X4]
Frequency range (-10 dB)	120 Hz - 20 kHz

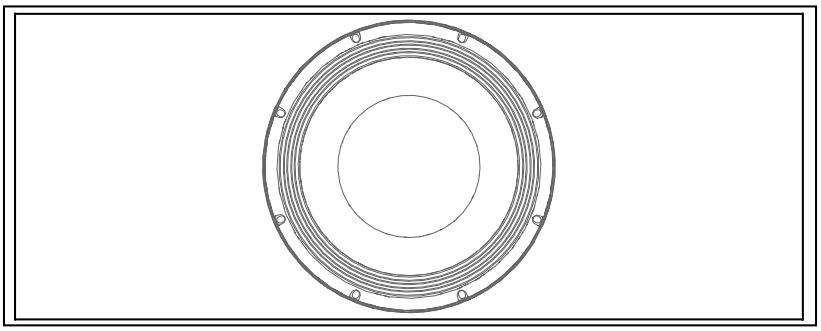
X4i point source with low-frequency element

In a typical distributed configuration with Syva Sub, the bandwidth of the X4i system is extended down to 29 Hz and the system contour is reinforced by 12 dB at 50 Hz.

The X4i enclosure is driven with the same preset as in point source configuration.

The [SYVA SUB_200] preset provides Syva Sub with an upper frequency limit at 200 Hz.

X4i and Syva Sub are driven by the LA2Xi / LA4X / LA8 / LA12X amplified controllers.



Enclosure	X4i	Syva Sub
Preset	[X4]	[SYVA SUB_200]
Frequency range (-10 dB)	29 Hz - 20 kHz	

Delay values
Do not forget to add the pre-alignment and geometric delays depending on the configuration.

Pre-alignement delays

X4i + Syva Sub

presets	**pre-alignment delay values and polarity settings**			
[X4] + [SYVA SUB_200]	X4i = 0 ms	+	Syva Sub = 0.5 ms	+

Inspection and preventive maintenance

How to do preventive maintenance

Inspect the system before any deployment and after any corrective maintenance operation.

Perform preventive maintenance at least once a year.

Refer to the maintenance manuals for advanced maintenance.

Rigging and hardware

Refer to the Mechanical system overview (p.18) to identify critical parts of the system.

Acoustics

Perform the Enclosure check (p.20).

Perform the Listening test (p.22) to detect any degradation in sound quality.

Mechanical system overview

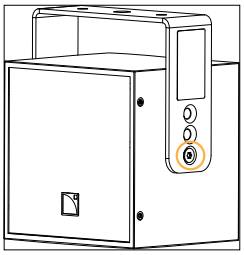
Critical parts of the lifting chains are highlighted.

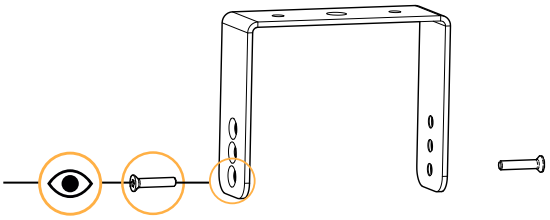
The  indicates a visual inspection. The  indicates a functional check.

Replacing screws
If a screw is loose, remove and replace it.
Always use the new screws provided in the repair kit.
If no new screw is available, add blue threadlocker before reusing the screw.
Do not apply more than the indicated torque.

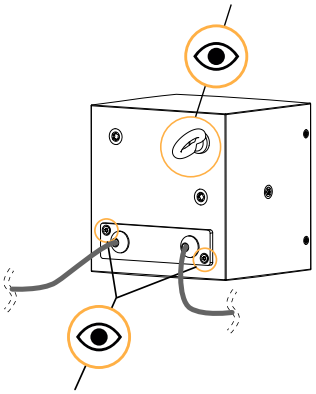
X4i flown with X-U4i

screws are not loose

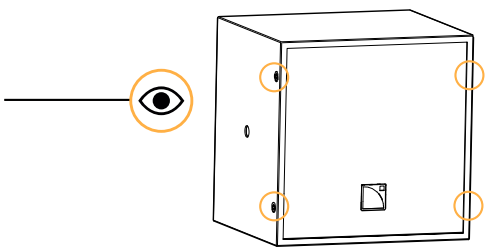




secondary safety is present

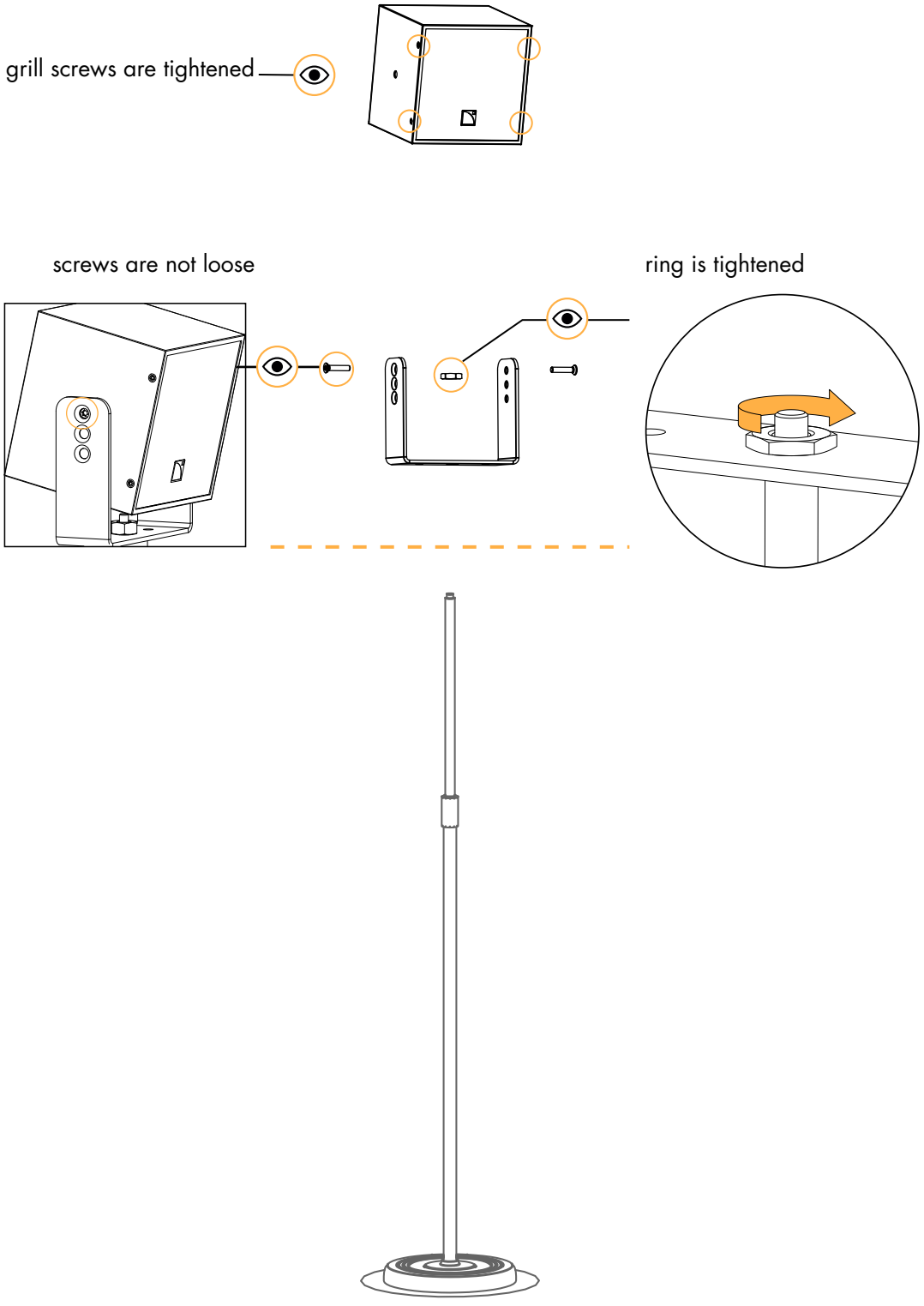


grill screws are tightened



connector sealing plate is secured

X4i pole-mounted with X-U4i



Acoustical check

Enclosure check

This feature is available on:
LA4X
LA12X

ENCLOSURE CHECK measures impedance at the reference frequencies for the connected loudspeaker family. The measured impedance is compared to the expected range allowing for fast detection of loudspeakers presenting circuit continuity issues.

The results can be used for preliminary diagnosis but cannot replace a comprehensive quality control.

Prerequisite

ENCLOSURE CHECK measurements can only be reliable if the following requirements are met:

Environment and temperature:
- Ambient temperature must be comprised between 0 °C / 32 °F and 40 °C / 104 °F. Ideal temperature is 20 °C / 68 °F.
- Enclosures must be at room temperature. If warm from a recent high level use or recently moved from a cold environment, let the loudspeakers reach room temperature before starting.

Enclosures:
- Enclosures must be included in the embedded factory preset library.
- Enclosures must be in nominal operating conditions:
  - Remove covers or dollies obstructing the loudspeakers or the vents.
  - Check for obvious physical damage or air leak: visually inspect the grill, gasket, cabinet, and connector plate for loose, missing or damaged parts.

Connection:
- Use only 10 m / 30 ft 4 mm^2 / AWG 11 speaker cables.
- Do not connect enclosures in parallel.

Amplified controllers:
- LA4X must run at least firmware version 1.1.0.
- LA4X load sensors must be calibrated. Refer to the **Load Sensor Calibration Tool** technical bulletin for more information.
- LA4X must warm up for at least 10 minutes after power up. Do not power off, reboot or switch to standby mode to avoid resetting the countdown.
- Load a preset corresponding to the connected loudspeaker's family. Presets from the user memories may be used on condition they are made of presets supported in the embedded factory preset library.

Procedure

1. Power up the amplified controller. Let LA4X warm up for at least 10 minutes.
2. Connect the loudspeaker enclosures to the amplified controller.
3. Load a preset from or built from the embedded library corresponding to the connected loudspeaker family.
4. On the amplified controller, use the encoder wheel to select **MONITORING & INFO**. Press the OK key or the encoder wheel to validate.
5. Use the encoder wheel to select **ENCLOSURE CHECK**.

   Beware of sound levels.
   Although the sound pressure levels generated for the ENCLOSURE CHECK are moderate, do not stay within close proximity of the loudspeakers and consider wearing ear protection.
6. Press the OK key or the encoder wheel to launch the ENCLOSURE CHECK.

   The amplified controller generates short sinusoidal signals simultaneously for each connected output.

   The amplified controller displays the results for each output.

7. Depending on the displayed results, follow the instructions in the table.

result	interpretation	instructions
OK	measured impedance is within expected range	enclosure is in working order electrically
?	unsupported preset family	only supported enclosures should be tested
NC	Not Connected	if cables are connected: **a.** inspect the cables and connections **b.** go to step 8 (p.21)
NOK	measured impedance is not within expected range	**a.** check that all the prerequisites are met, in particular that the loaded preset corresponds to the connected speaker's family **b.** inspect the cables and connections **c.** go to step 8 (p.21)
UNDEF	measured impedance is undefined	

8. Under NC, NOK and UNDEF results, press and hold the corresponding OUT key.

The amplified controller displays:

- the tested frequencies,
- information on the measured impedance:
  - OPEN for open circuit (found in NC results),
  - SHORT for short circuit (found in NOK results), or
  - a percentage of variation from the expected range (found in NOK and UNDEF results)
- the number of operational transducers out of the total

Low variations from the expected range are acceptable: displayed percentage can be different from 0 and all transducers considered operational.

Listening test

enclosure	preset	usable bandwidth
X4i	[X4]	120 Hz - 20 kHz

Procedure

1. Load the preset on an LA2Xi / LA4X / LA8 / LA12X amplified controller.
2. Connect a sinus generator to the amplified controller.

   Risk of hearing damage
   Set a low sound level to start and use ear protection to adjust before testing.
3. Scan the bandwidth focusing on the usable range.
   The sound should remain pure and free of unwanted noise.

Troubleshooting for LF speakers

One or more LF speaker produces distorted, buzzing, rubbing, clicking, muffled or weak sound.

Possible causes

- The screws are not tightened with the appropriate torque.
- There is an air leak in the gasket.
- There is dust on the cone.
- The cone is damaged.
- The surround is torn or delaminated.
- The voice coil or the spider is damaged.

Procedure

1. Perform the speaker disassembly procedure.
2. Visually inspect the cables and the connectors.
3. Visually inspect the speaker cone, the voice coil and the spider.

   If any damage is visible, replace the speaker.
4. Carefully clean the speaker with a dry cloth.
5. Perform the reassembly procedure.
   Replace the speaker gasket and the screws.
   Apply the recommended torque.
6. Repeat the listening test.

   If the problem persists, replace the speaker.

Troubleshooting for HF drivers

One or more HF driver produces high-frequency harmonic distortions, strange vibrations or weak sound.

Possible causes

- There are foreign particles on the air gap.
- The screws used for reassembly are too loose.
- The diaphragm is damaged.

Remedy

Contact L-Acoustics for more instructions.

Rigging procedures

Flying X4i

type of deployment	wall-mounting
	ceiling-mounting
rigging accessories	X-U4i
additional material	2 x ∅6 mm / M6 screws and anchors (depending on the support material)
	blue threadlocker
tools	torque screwdriver
	T25 Torx bit

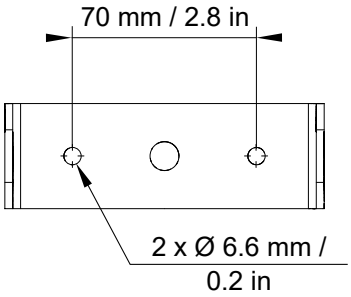
Secondary safety for flown enclosures
Use one insert at the back of the enclosure to implement a secondary safety.

Fasteners for wall-mounting or ceiling-mounting
Secure the bracket with two M6 screws.
Select screw length and anchors applicable to the wall or ceiling properties.

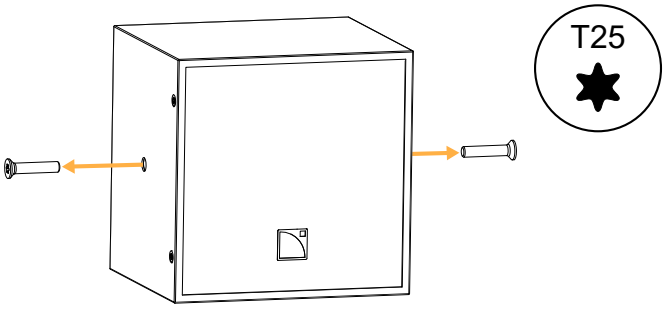
Assembly

Procedure

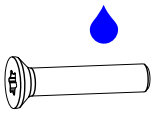
1. Secure X-U4i to the wall or to the ceiling using two M6 screws.



2. On both sides of the enclosure, remove the screws.



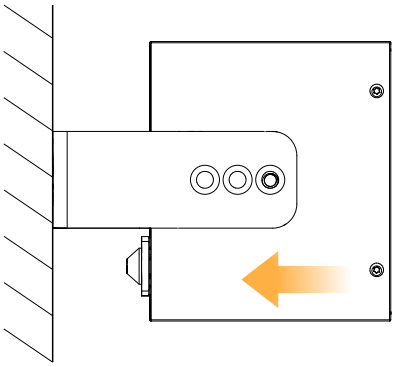
3. Apply blue threadlocker on the screws.



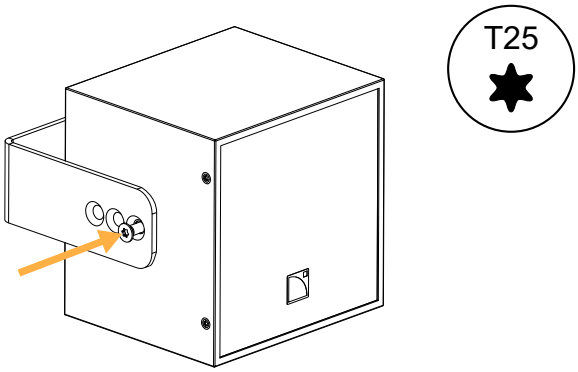
Risk of injury
Keep fingers away from the contact area between the bracket and the enclosure.

Site angle
Choose the appropriate hole to adjust the gap between the enclosure and the bracket and to optimize visual impact.

4. Position the enclosure inside X-U4i and align the inserts with the selected holes on the bracket.

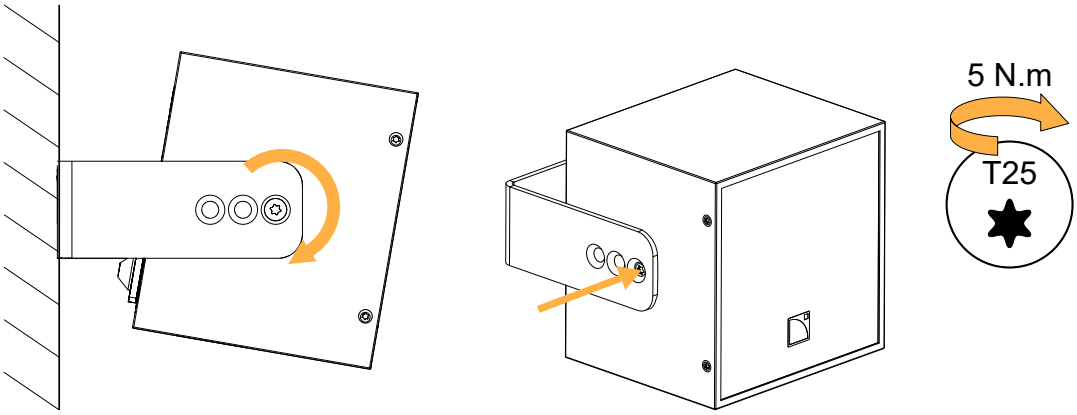


5. Partially drive the screws.



Risk of damaging the insert
Do not overtighten the screw.

6. Adjust the angle and tighten the screws.
Make sure the enclosure is steady.



Pole-mounting X4i

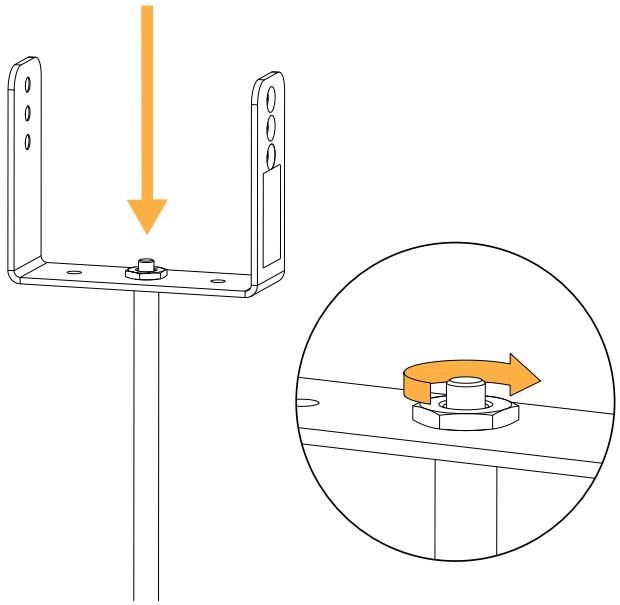
type of development	pole-mounting
rigging accessory	X-U4i
	microphone stand
tools	torque screwdriver
	T25 Torx bit

Adapter for US microphone stand
Use a 3/8"-16 male to 5/8"-27 female microphone screw adapter and a locking ring to mount X4i on a US standard microphone stand.

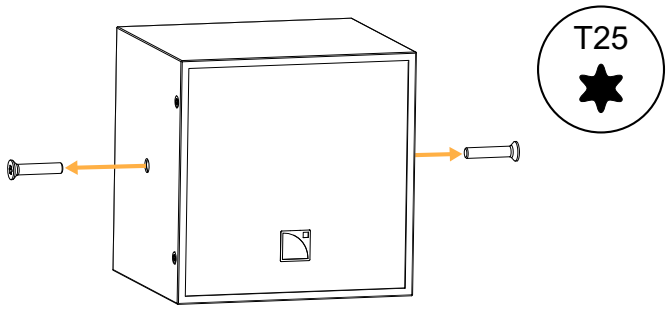
Assembly

Procedure

1. Secure the microphone stand to X-U4i with the locking ring.



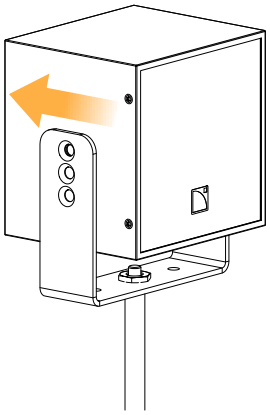
2. On both sides of the enclosure, remove the screws.



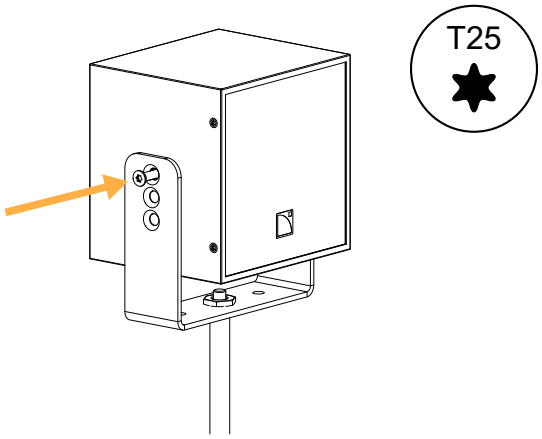
Risk of injury
Keep fingers away from the contact area between the bracket and the enclosure.

3. Position the enclosure inside X-U4i and align the inserts with the selected holes on the bracket.

Limited rotation capabilities in pole-mount configuration
Choose the appropriate hole to adjust the gap between the enclosure and the bracket and to optimize visual impact.

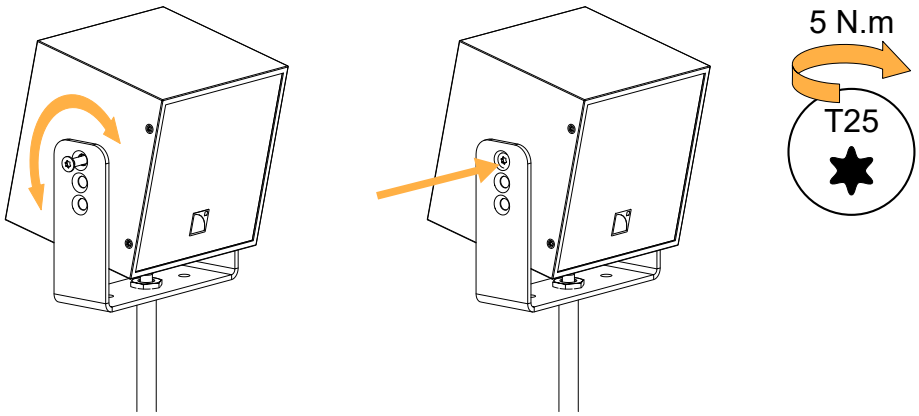


4. Partially drive the screws.



Risk of damaging the insert
Do not overtighten the screw.

5. Adjust the angle and tighten the M5 screws.
Make sure the enclosure is steady.



Connection to LA amplified controllers

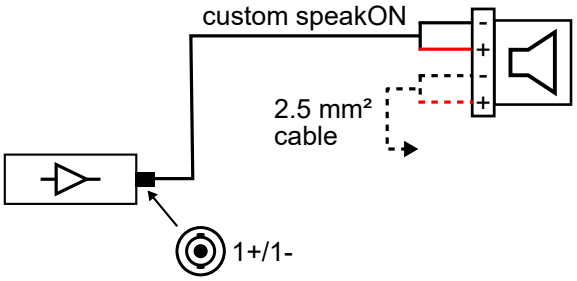
Enclosure drive capacity per amplified controller

Make sure the total number of connected enclosures does not exceed the maximum number of enclosures per controller (refer to the footnotes).

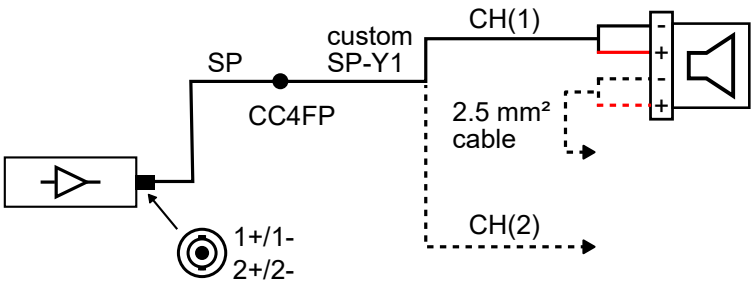
	LA2Xi	LA4X	LA8	LA12X
	per output * / total	per output * / total	per output * / total	per output * / total
X4i	4 / 16	4 / 16	6 / 24	6 / 24
Syva Sub	1 / 4	1 / 4	2 / 8	3 / 12

Cabling schemes for X4i

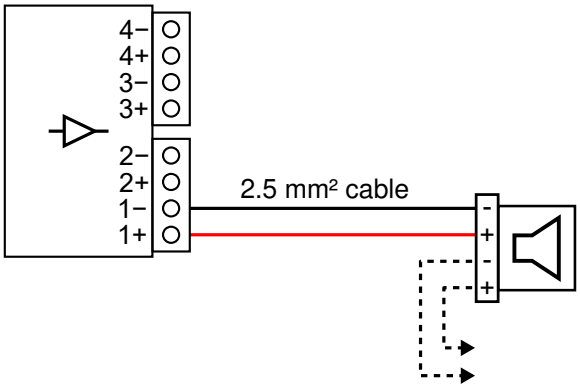
One-channel speakON output



Two-channel speakON output



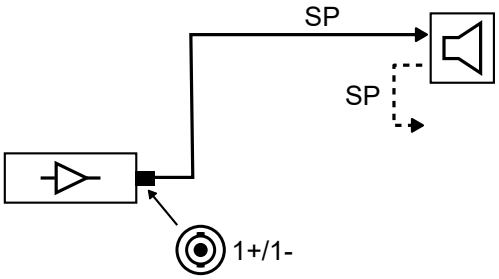
Terminal block output (LA2Xi)



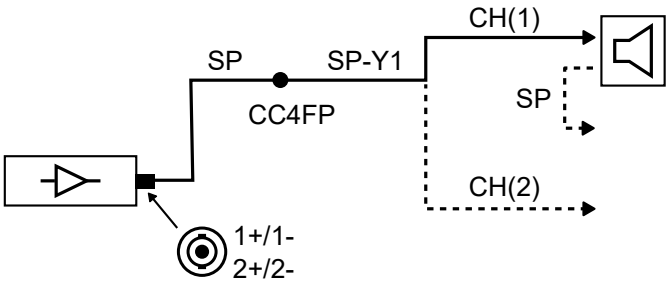
* For passive loudspeakers, the value corresponds to the number of enclosures in parallel on the output. For active loudspeakers, the value corresponds to the number of sections in parallel on the output.

Cabling schemes for Syva Sub

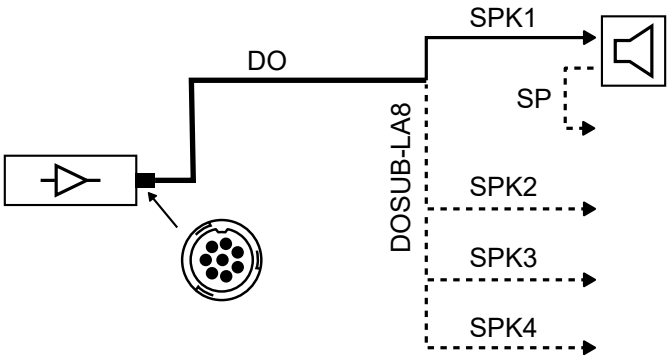
One-channel speakON output



Two-channel speakON output

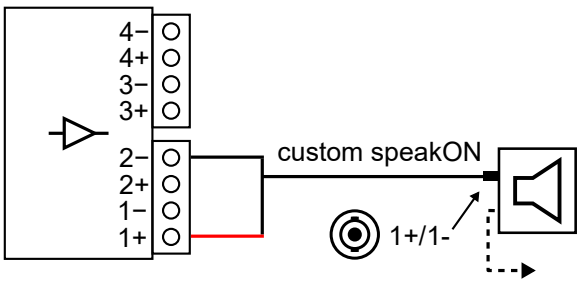


Four-channel CA-COM output



Terminal block output (LA2Xi)

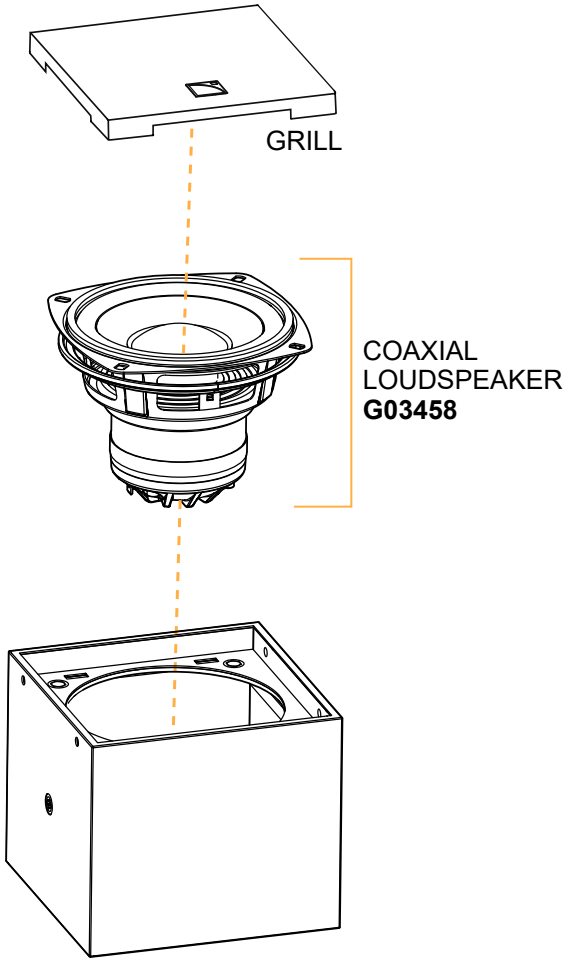
To connect Syva Sub to LA2Xi, it is recommended to use a bridge-tied load configuration (BTL).



Corrective maintenance

Exploded view

In order to operate, follow the order outlined here.



Disassembly and reassembly procedures

D/R - Grill

Tools

- torque screwdriver
- T10 Torx bit

Consumables

- blue threadlocker

Repair kits

G03458

KR coaxial speaker X4i

×4

S240

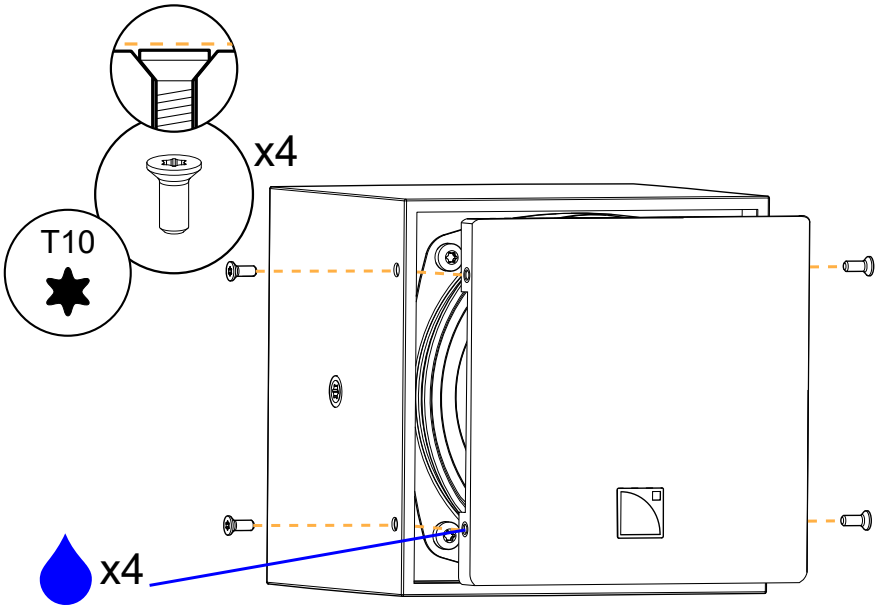
M3×8 Torx

Exploded view

Gradually tighten the screws following a star pattern.

Position the grill with the logo at the bottom.

Put blue threadlocker in the grill inserts before reassembly.



D/R - Coaxial loudspeaker

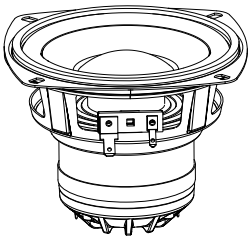
Tools

- torque screwdriver
- T20 Torx bit

Repair kit

G03458

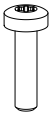
KR coaxial speaker X4i



×1

FT03351

4" coaxial driver - 16 ohms



×4

S100025

M4×16 Torx

×2

102259

4" speaker gasket

Prerequisite

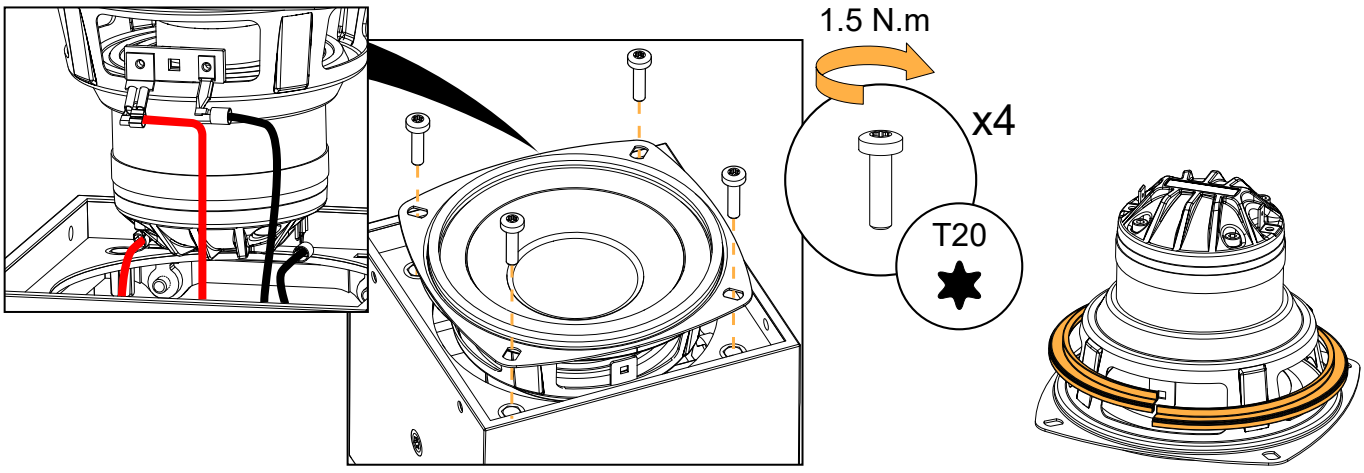
Grill removed. See Grill (p.30).

Exploded view

For safety reasons, always use the new screws and spare parts provided in the KR.
If no new screws are available, use blue threadlocker.

Gradually tighten the screws following a star pattern.

If the speaker gasket is damaged, remove and replace it.



What to do next

Perform the Acoustical check (p.20) procedures.

Specifications

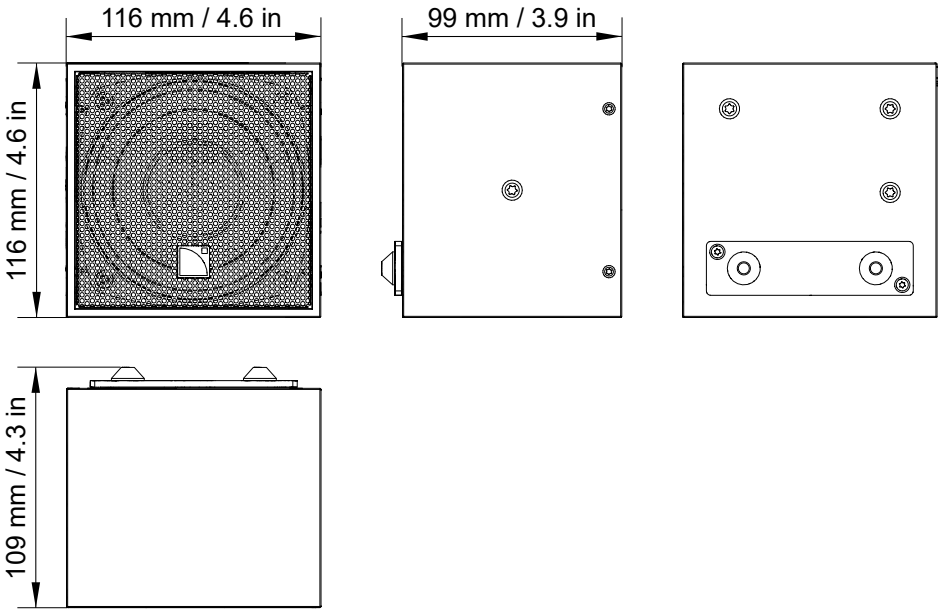
X4i specifications

Description	2-way passive coaxial enclosure amplified by LA2Xi / LA4X / LA8 / LA12X
Usable bandwidth (-10 dB)	120 Hz - 20 kHz ([X4])
Maximum SPL[1]	116 dB ([X4])
Nominal directivity (-6 dB)	110° axisymmetric
Transducers	LF: 1 × 4" neodymium
	HF: 1 × 1.4"
Acoustical load	closed enclosure
Nominal impedance	16 Ω
Connectors	IN: 1 × 2-point screw terminal
	LINK: 1 × 2-point screw terminal
Rigging and handling	2 M5 inserts for X-U4i
	2 M6 inserts for rigging accessory
Safety	1 M6 insert for secondary safety
Weight (net)	1 kg / 2.2 lb
Cabinet	premium grade Baltic birch plywood
Front	coated steel grill
Finish	dark grey brown Pantone 426 C
	pure white RAL 9010
	custom RAL code on special order
IP	IP55[2]

[1] Peak level at 1 m under free field conditions using pink noise with crest factor 4 (preset specified in brackets).

[2] With connector sealing plate.

X4i dimensions

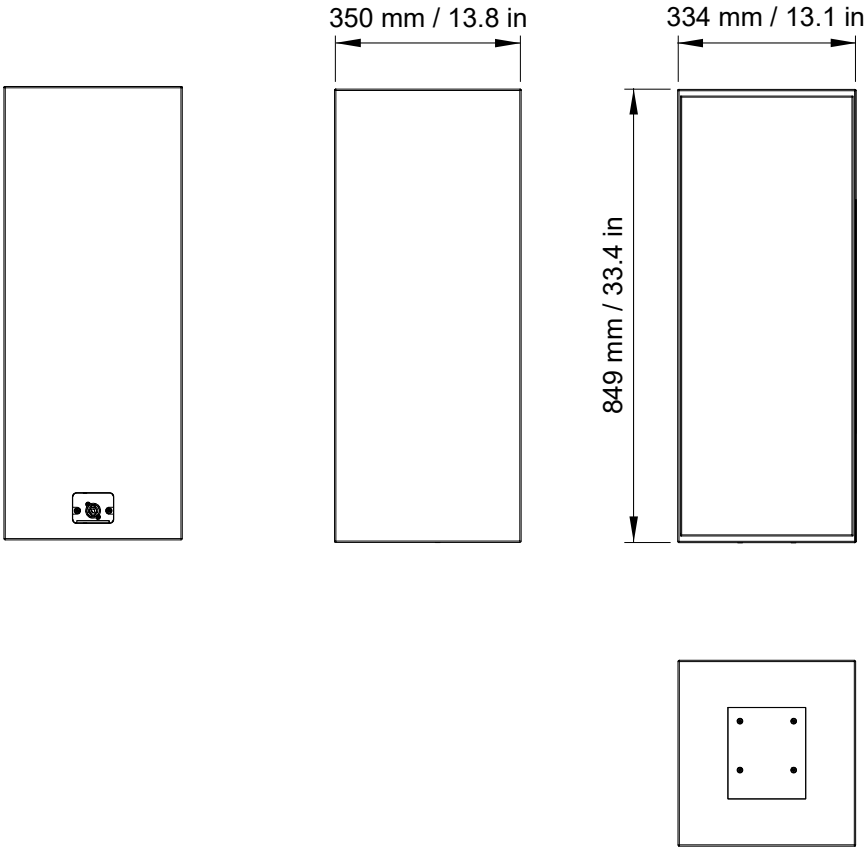


Syva Sub specifications

Description	Infra low frequency subwoofer: 1 x 12'' LF, amplified by LA2Xi / LA4X / LA8 / LA12X
Low frequency limit (-10 dB)	27 Hz ([SYVA SUB_100])
Maximum SPL[1]	128 dB ([SYVA SUB_100]) with LA2Xi (bridge mode) / LA4X / LA8 / LA12X
	123 dB ([SYVA SUB_100]) with LA2Xi
Transducers	1 × 12" cone driver
Acoustical load	bass-reflex, L-Vents
Nominal impedance	8 Ω
Connectors	IN: 1 × 4-point speakON
	1 AutoConnect
Weight (net)	27 kg / 60 lb
Cabinet	premium grade Baltic beech and birch plywood
Front	coated steel grill
	acoustically neutral 3D fabric
Finish	dark grey brown Pantone 426 C
	pure white RAL 9010
	custom RAL code on special order
IP	IP55

[1] Peak level at 1 m under half space conditions using pink noise with crest factor 4 (preset specified in brackets).

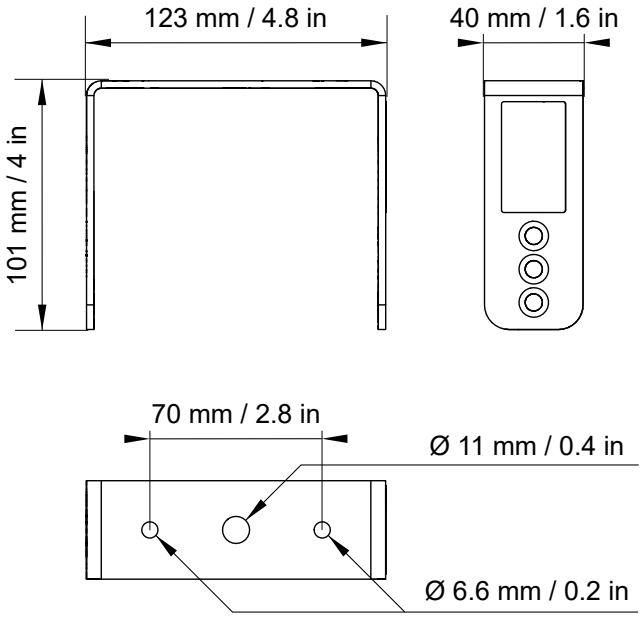
Syva Sub dimensions



X-U4i specifications

Description	Adjustable U-bracket for X4i
Weight (net)	0.3 kg / 0.7 lb
Material	steel with anti-corrosion coating

X-U4i dimensions



L-Acoustics
13 rue Levacher Cintrat - 91460 Marcoussis - France
+33 1 69 63 69 63 - info@l-acoustics.com
www.l-acoustics.com

L-ACOUSTICS
GROUP