EAW®
EASTERN ACOUSTIC WORKS

Line Array
Application Guide

Line Array Application Guide

Using the Loudspeaker

Users will need to perform the following general tasks to properly put an EAW line source product into use. This manual includes details for each task.

1. Design the system using the Resolution™ 2 Design & Control Software (see the program Help File for further information about using Resolution).

2. Design and install suspension points to support the array(s)/rigging in intended locations and aimed in the desired directions. If ground-stacked, provide a level surface capable of supporting the total weight of the array(s).

3. Connect the loudspeakers to a supported EAW Processor and/or power amp.

4. Set-up and adjust overall system gain and signal processing, as needed to maximize the array's performance for the application.

5. Provide training to operate the loudspeakers within their limits.

6. Provide regular inspection and maintenance to maintain the integrity of the installation and the performance of the loudspeakers.

Array Design

See Resolution Help File for assistance in properly designing line array systems.

Software

EAW Resolution 2 software is designed to assist in SPL predictions, determine splay angles, and calculate rigging limits for all line array items.

Always ensure that your EAW Resolution software is up-to-date.

For a complete list of recommended system requirements, please refer to the Resolution 2 help file.

Using EAW Resolution™

EAW Resolution is the key to determining the optimal array configuration for any application. Rooted in EAW's proprietary FChart modeling and calculation engine, Resolution allows users to easily model any venue and visualize a wide variety of array designs to determine what particular array configuration is best suited to the venue.

Users simply need to define the array position, allowable trim, minimum clearance, and quantity of modules available and use the Array Assistant to determine the optimal array configuration for a given venue. In many situations no further prediction work will be necessary for optimal results. Users can also adjust the results after running the Array Assistant by manually adding/removing modules or adjusting coverage and observing changes in predicted results. In this way Adaptive arrays can be optimized for any application.

Additionally, Resolution interfaces directly with Adaptive Systems via the Dante protocol, allowing users to easily upload the processing parameters for their system directly from their model to the physical array, adjust equalization and coverage, and monitor all Adaptive components in real time. No additional software is necessary to use Adaptive systems.

No additional software is necessary to use Adaptive systems.

Please visit www.eaw.com to download the latest version of Resolution. Instructional videos can be viewed on education.eaw.com.

Line Array Application Guide

EAW Passive Line Array Products - KF810P

Phase Aligned LF Tuned spacing of LF components to extend pattern control without the need for enormous horns.

Symmetry of Sources Symmetrical arrangement of acoustic sources along a common axis for utmost consistency throughout the coverage pattern.
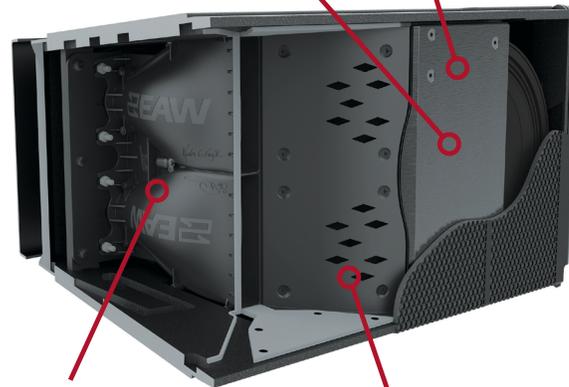
Isophasic Waveguide Transforms the acoustic input source to a true Isophasic output.

Concentric Summation Array (CSA) A method of seamlessly integrating MF and HF components within a single horn. With CSA, multiple subsystems sum coherently, without interruption to either HF or MF wavefronts.

PERFORMANCE		
Max SPL[1]	145dB	
Operating Range[2]	50 Hz to 20 kHz	
Nominal Beamwidth[3]	KF810|80 = 80° Horizontal x 10° Vertical	
	KF810|110 = 110° Horizontal x 10° Vertical	
RMS Power Handling[4]	LF: 1000w	HF: 500w
Input Impedance[5]	LF: 8 Ω	MF/HF: 8 Ω

CONFIGURATION		
Subsystem	*Transducer*	*Loading*
LF	2X 10in, 3.0in Voice Coil	Ported, Phase Aligned
MF	4X 5in, 1.7in Voice Coil	Horn-loaded w/CSA™ Aperture
HF	2X 1.4in exit, 3in Voice Coil	Isophasic Waveguide
Operating Mode	*Amplifier Channels*	*External Signal Processing*
Bi-amp	LF, MF / HF	DSP w/EAW Focusing

NOTES

1 Calculated max SPL at 1m with 4:1 (12dB) crest factor pink noise. Specified as whole space (free field) for full range loudspeakers, half space for subwoofers.

2 Operating Range: Range where the processed Frequency Response stays within -10 dB SPL of the power averaged SPL within this range; measured on the geometric axis. Narrow band dips are excepted.

3 Nominal Beamwidth: Design angle for the -6 dB SPL points, referenced to 0 dB SPL as the highest level.

4 Accelerated Life Test: Maximum test input voltage applied with an EIA-426B defined spectrum; measured with recommended signal processing and Recommended Protection Filter.

5 Nominal Impedance: Selected 4, 8, or 16 ohm resistance such that the minimum impedance point is no more than 20% below this resistance over the Operating Range.

Line Array Application Guide

KF810P|80
KF810P|110

PROPRIETARY RIGGING SYSTEM

NOTES:
1. SYMBOL ⊕ INDICATES CENTER OF BALANCE
2. WEIGHT APPROXIMATELY 88 lb [40 kg]
3. SHIPPING WEIGHT APPROXIMATELY 106 lb [48 kg]

OPTIONAL REAR COVER

17.45 [443.2]

TOP/BOTTOM

12.56 [319.1]

32.87 [835.0]

FRONT

SIDE

9.72 [246.9]
10.7 [273]
10°
6.2 [158]
14.04 [356.7]

INPUT

REAR
REAR COVER NOT SHOWN FOR CLARITY

THIRD ANGLE PROJECTION

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UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS ARE IN INCHES DUAL [MM] DIMENSIONS FOR REF ONLY

TOLERANCE IN INCHES LINEAR ±0.13in /±3.3 mm ANGLES ±1°

(X.XX) = REF DIMS NO TOLERANCE IMPLIED

TBC = THEORETICAL SHARP CORNER

DIMENSIONS ACROSS CENTERLINES TO BE SYMMETRICAL

www.eaw.com

TITLE:
DWG CUSTOMER KF810P [MECHANICAL SPECIFICATION]

SHEET 1 OF 1

SCALE: 0.080

DRAWING NUMBER:
2070008-CD

REVISION: A

PTC CREO

REV	CHANGE NUMBER	DATE
A	ECOEAW0199	7/10/19

Line Array Application Guide

EAW Passive Line Array Products - SB818P|F

18in Premium Transducer
With wicked long excursion
5.3in voice coil driver

Retractable Rigging
For groundstack
configuration

Cable Chases
On front and
back conceal
wiring and
rigging for
clean look

Back Grille
Optional back grille for
smooth, seamless look in
cardioid configurations

PERFORMANCE	
Max SPL[1]	137dB
Operating Range[2]	32HZ–124Hz
Nominal Beamwidth[3]	*Horizontal* 360° *Vertical* 360°
RMS Power Handling[4]	1800W
Input Impedance LF[5]	8Ω

CONFIGURATION		
Subsystem LF	*Transducer*	*Loading*
	1x18in, 5.3in Voice Coil	Vented
Operating Mode	*Amplifier Channels*	*External Signal Processing*
Single-amp	1	EAW DSP

NOTES

1 Calculated max SPL at 1m with 4:1 (12dB) crest factor pink noise. Specified as whole space (free field) for full range loudspeakers, half space for subwoofers.

2 Operating Range: Range where the processed Frequency Response stays within -10 dB SPL of the power averaged SPL within this range; measured on the geometric axis. Narrow band dips are excepted.

3 Nominal Beamwidth: Design angle for the -6 dB SPL points, referenced to 0 dB SPL as the highest level.

4 Accelerated Life Test: Maximum test input voltage applied with an EIA-426B defined spectrum; measured with recommended signal processing and Recommended Protection Filter.

5 Nominal Impedance: Selected 4, 8, or 16 ohm resistance such that the minimum impedance point is no more than 20% below this resistance over the Operating Range.

SB818P|F mechanical specification drawing (EAW Customer SB818P|F, Drawing Number 2070135-CD, Rev A, 7/11/19)

NOTES:
1. SYMBOL ⊕ INDICATES CENTER OF BALANCE
2. WEIGHT APPROXIMATELY 114 lb [52 kg]
3. SHIPPING WEIGHT APPROXIMATELY 136 lb [62 kg]

4X PROPRIETARY RIGGING SYSTEM

TOP — 25.20 [640.0], 16.2 [413]
FRONT — 32.87 [835.0], 19.09 [485.0], 19.40 [492.8]
SIDE — 10.6 [270], 9.7 [246], 20.62 [523.6]
REAR — INPUT
BOTTOM — 4X FEET

REV	CHANGE NUMBER	DATE
A	ECOEAW0248	7/11/19

TITLE: DWG CUSTOMER SB818P|F [MECHANICAL SPECIFICATION]

SCALE: 0.060   REVISION: A
SHEET 1 OF 1
DRAWING NUMBER: 2070135-CD
PTC CREO
www.eaw.com

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS ARE IN INCHES
DUAL [MM] DIMENSIONS
FOR REF ONLY
TOLERANCE IN INCHES
LINEAR ± 0.13 in / ± 3.3 mm
ANGLES ± 1°
(X.XX) = REF DIMS
NO TOLERANCE IMPLIED
TSC = THEORETICAL SHARP CORNER
DIMENSIONS ACROSS CENTERLINES
TO BE SYMMETRICAL

THIRD ANGLE PROJECTION

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Line Array Application Guide

CONFIGURATION		
Subsystem	*Transducer*	*Loading*
LF	2x10" cone, 2.5" VC	Vented
HF	1x1.4" exit, 3" VC compression drivers	Isophasic Wave Guide
Operating Mode		
	Amplifier Channels	*External Signal Processing*
Single-amp	LF/HF	DSP w/EAW Focusing™ & DynO™
Bi-amp	LF, HF	DSP w/EAW Focusing™ & DynO™

PERFORMANCE		
Operating Range		55Hz–18kHz
Nominal Beamwidth		Horz: 90° Vert: 12°
Accelerated Life Test		
LF/HF	63V	500 W @ 8 ohm
LF	69V	600 W @ 8 ohm
HF	35V	150 W @ 8 ohm

Line Array Application Guide

EAW Passive Line Array Products - KF210
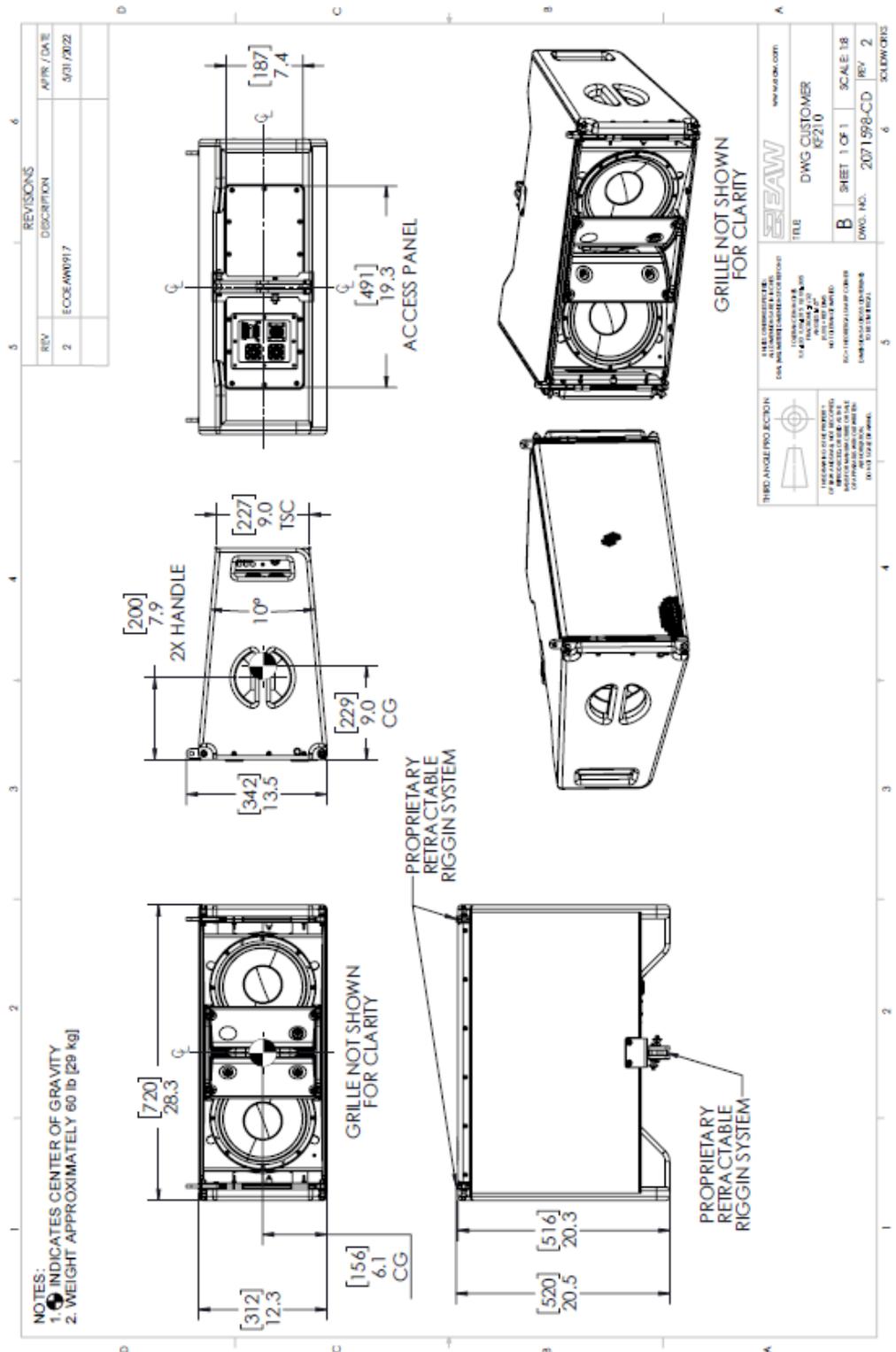
Line Array Application Guide
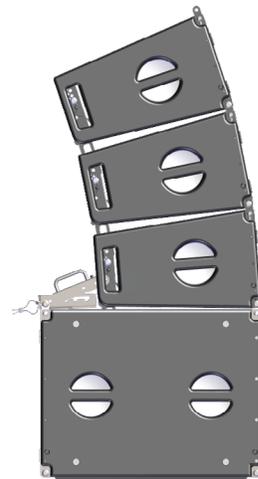
CONFIGURATION		
Subsystem	*Transducer*	*Loading*
LF	1x18", 4" VC	Vented
Operating Mode		
	Amplifier Channels	*External Signal Processing*
Single-amp	LF	DSP w/EAW DynO™

PERFORMANCE	
Operating Range	25hz-120hz
Nominal Beamwidth	Horz: 360° Vert: 360°
Max SPL	136dB

EAW Passive Line Array Products - SB818

Line Array Application Guide

How Array Length Affects Directivity

It would be beyond the scope of this guide to go into the physics of how line arrays behave.

The key to directivity is array length. This should not be confused with the number of drivers. A properly designed line array system will exhibit the same directivity from the same physical length regardless of whether this length is made up of 8", 10", 12" or 15" components.

The determining factor is the length of the array itself and how that length affects the wavelength being produced.

The samples below show three array types in the same venue. The first array is very short with only 4x KF810P-80 modules being deployed. The contour line feature in Resolution has been used to clearly show the definition of the vertical contour at 125Hz. It is clear that with this array length, the 125Hz frequency is seeing only slight directivity control.
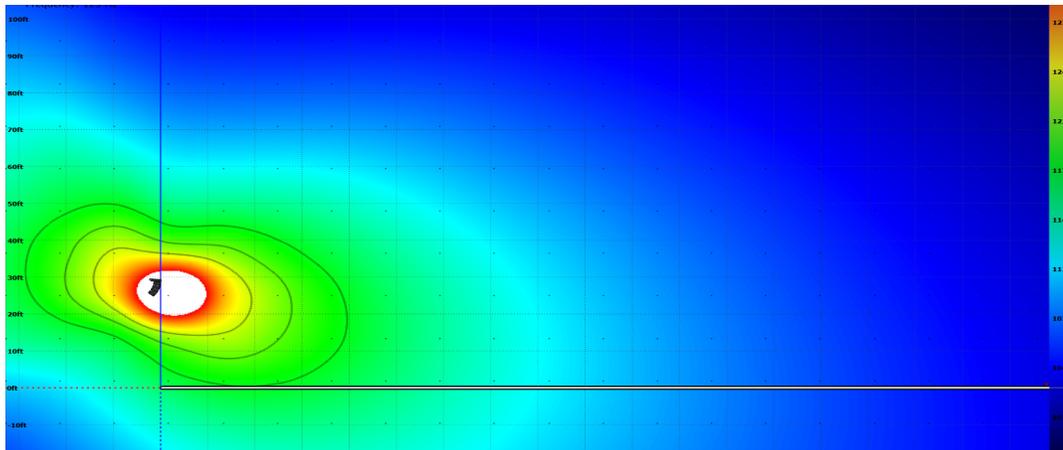
The second image demonstrates what would happen with the same frequency in the same venue but with 8x KF810P-80 line items. It is quite clear how much more directive the vertical has become in this image and if we continue to add modules to the array, the effect will become more pronounced.
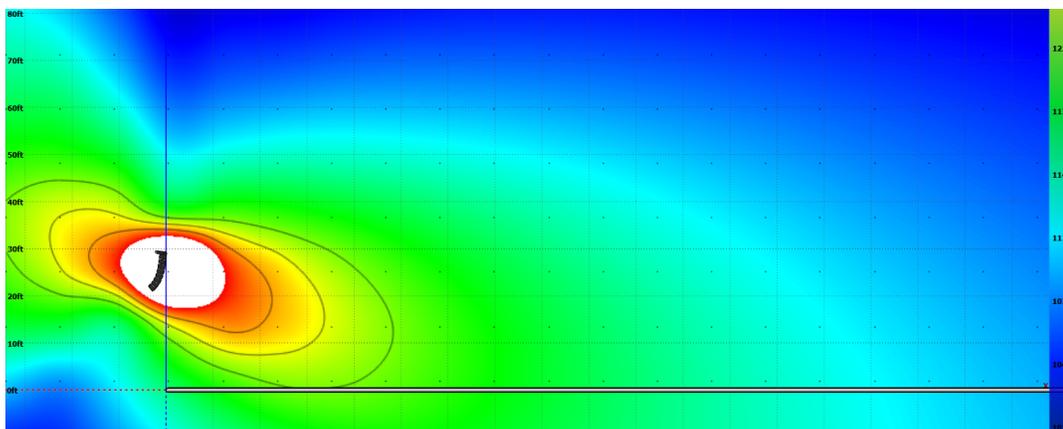
Line Array Application Guide

Finally, we see the result when 12x KF810P-80 is deployed. This array produces an extremely tight vertical pattern at 125Hz across this listening area. If directivity at lower frequencies is required for the application, array length must be considered.
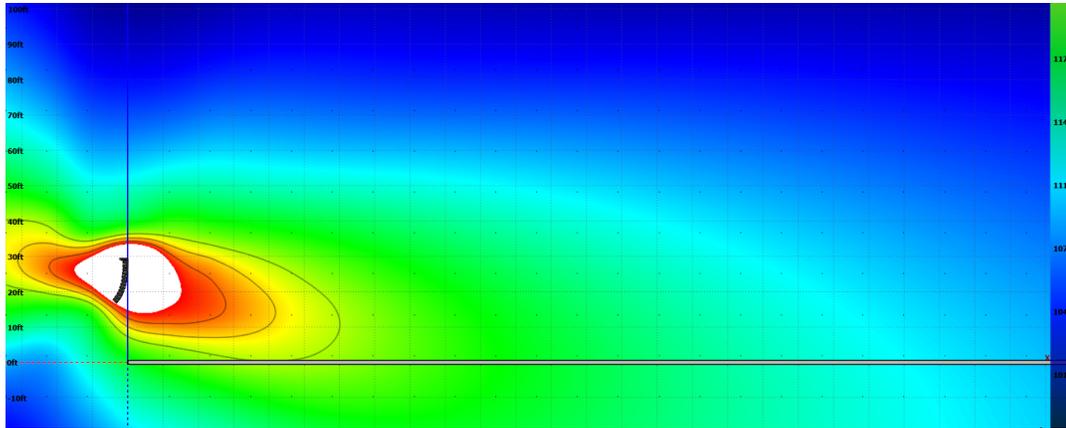
Pairing with EAW UXA4416 Power Amplifier

Below are the recommended configurations when using UXA4416 with line array products

KF810P
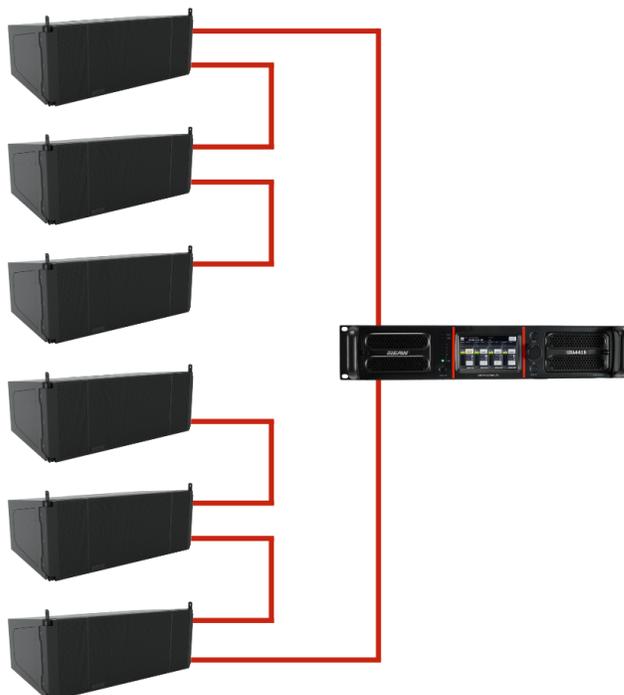
MODEL	PER CHANNEL	PER AMPLIFIER
UXA4416	3	6

Line Array Application Guide

SB818P|F
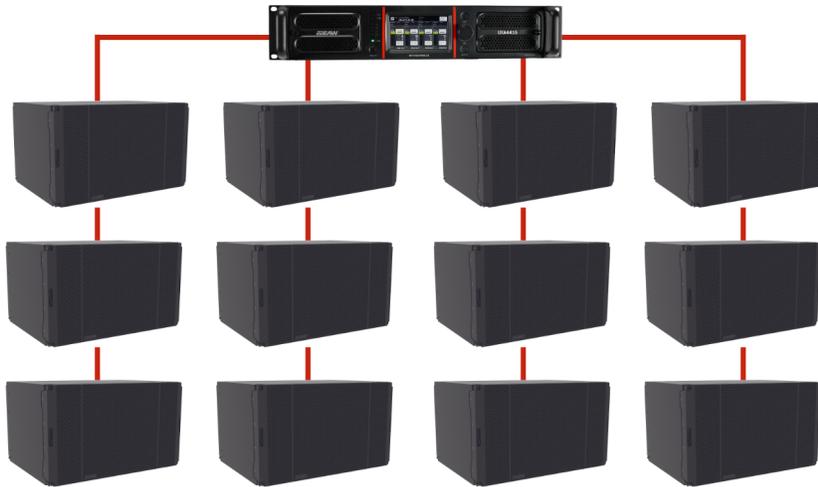
MODEL	PER CHANNEL	PER AMPLIFIER
UXA4416	3	12

KF210 - Bi Amped

MODEL	PER CHANNEL	PER AMPLIFIER
UXA4416	3	6

Line Array Application Guide

KF210 Single Amp
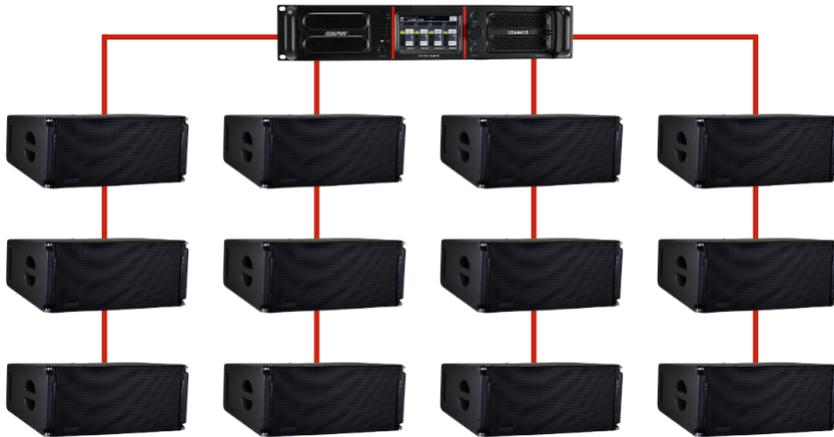
MODEL	PER CHANNEL	PER AMPLIFIER
UXA4416	3	12

KF810P Input Connection

KF810P is a 3-way line array product, utlizing a passive crossover between the MF/HF. When wiring to UXA4410, utilize NL4 in outputs 1 & 3. Connect 2 pins +/- to LF, then the other 2 pins +/- to MF/HF into a Phoenix connector (which can then plug into the KF810P input). It's possible to loop 2 more cabinets in the same manner using Loop Thru.

3-Way, Bi-Amp (LF, MF/HF)

EAW FOCUSING — AMP — XVR — HF

AMP — MF

LF

LF HF/MF

LOOP THRU

LF HF/MF
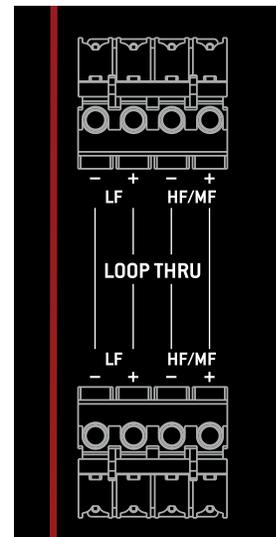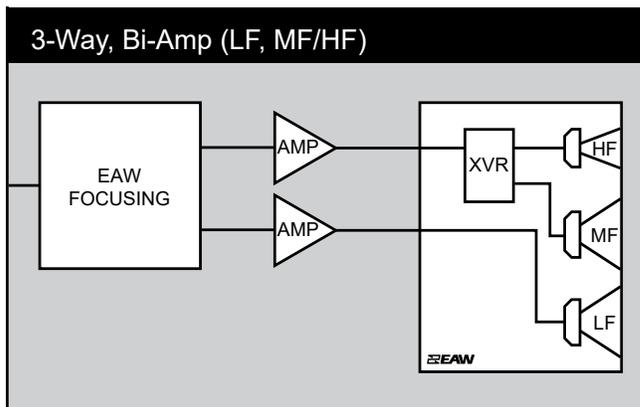
Line Array Application Guide

SB818P|F Input Connection

SB818P|F utilizes a 2 pin +/- Phoenix connector. Using UXA4410, use NL4 with pins 1 +/- wired, then connect the bare wire pins 1 +/- to the connector (which can then plug into the sub). If multiple subs are being used, use the same NL4 connector and wire the pins 2 +/- and connect pins 2 +/- to another Phoenix connector to then plug into additional subs. When using this type of configuration, plug NL4 connectors into outputs 1 & 3 of UXA4410. It's possible to loop 1x more cabinet using Loop Thru.
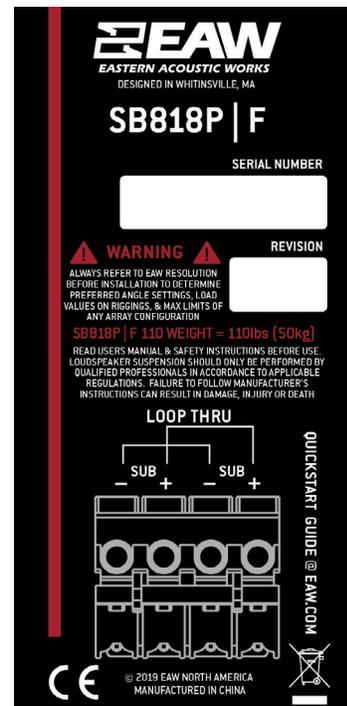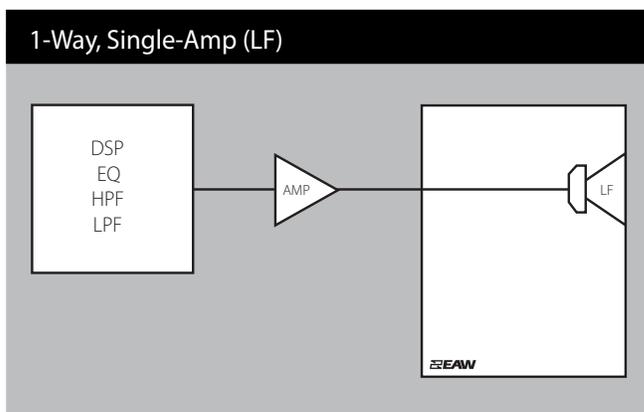
KF210 Input Connection

KF210 utilizes an NL4 connection with a switch for single or bi amped operation. When the switch is in single amped mode, pin 1 only is utilzed. When in bi amped mode, pin 1 +/- is LF, and pin 2 +/- is HF. When wiring to use with UXA4410 in single amp mode, plug NL4 into any output on the amp, then directly into the cabinet (NOTE: Pin 2 +/- will be unused). When using bi amp, plug into UXA4410 outputs 1 & 3, then directly into the cabinet. It's possible to loop 3x more cabinets in either mode.

Line Array Application Guide

2-Way, Single-Amp (LF/HF)

HPF → AMP → XVR → HF / LF

2-Way, Bi-Amp (LF, HF)

DSP
EQ
DELAY
HPF/LPF → AMP → HF
→ AMP → LF

EAW
EASTERN ACOUSTIC WORKS
DESIGNED IN WHITINSVILLE, MA

KF210

SERIAL NUMBER   REVISION

QUICKSTART GUIDE AT EAW.COM

LOOP

SIN-
PIN 1 -/+ = LF/HF -/+
PIN 2 -/+ = N/C
LF/HF = 8Ω

BI-AMP
PIN 1 -/+ = LF -/+
PIN 2 -/+ = HF -/+
LF = 8Ω   HF = 8Ω

© 2022 EAW NORTH AMERICA
MANUFACTURED IN CHINA
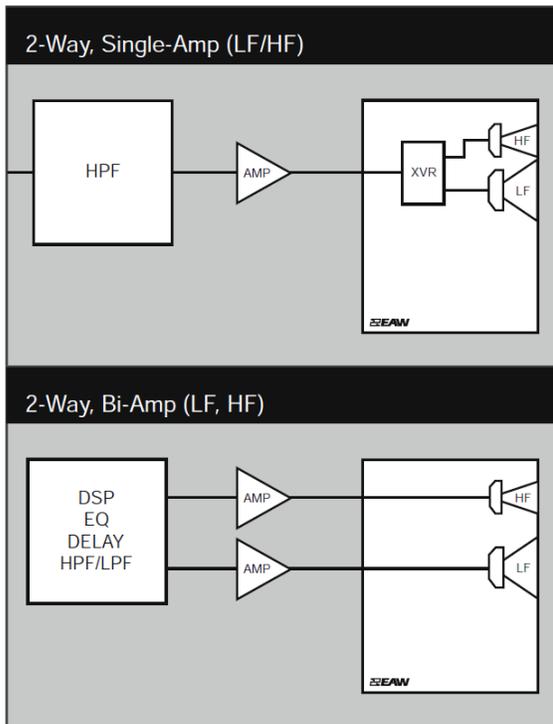
Using UXA4416 Power Amplifier

It is required to use an EAW amplifer with any EAW line array products. Important processing such as limiting, FIR filters, and DYNO (Dynamic EQ) is prudent to the loudspeakers performance.

Line Array Application Guide

Front Panel Layout

1. **Power/Standby** When the amplifier is connected to main supply, press the button switch from STAND BY to ON status.

2. **Power LED**
    - RED - Standby
    - YELLOW - Starting Up
    - GREEN - Device ON

3. **Communication LED -** YELLOW

4. **General Fault LED** YELLOW indicates a general fault has been detected (connected to the FAULT GPO on the rear panel).

5. **Output Status LED** Show is the signal is:
    - OFF = Absent
    - Green = Present
    - Yellow = Higher than +34 dBu
    - Red = Clipping (higher than +43 dBu)

6. **4.3" TFT capacitive touch screen dispaly** Implements all amplifier configuration controls and monitoring information.

7. **Multifunctional Encoder** Allows to navigate the user interface on the display as a support to touch screen interaction.

8. **Back/ESC Button**
    - Short press goes back to previous HMI panel
    - Long press goes to HOME screen

9. **MENU Button** Open amplifier MAIN MENU.

10. **Removable grille with dust filter behind**

11. **Mains Overload LED** RED indicates an overload on the mains voltage.

12. **Metal Handles**

Line Array Application Guide

Rear Panel Layout

13.**Mains Socket** PowerCON Connector.

14.**Two Programmable GPIO** 3 Pole Euroblock connector.

15.**General Fault GPIO** 3 pole Euroblock connector working both as NC and NO.

16.**Four analog inputs (A1-A4)** XLR Connectors

17.**Four digital inputs (D1-D4, alternative to A3 & A4)** Stereo inputs on XLR connectors.

18.**LAN1 & LAN2** Connect the amplifier for configuration, control and monitoring purpose. RJ 45 connectors.

19.**Dante Primary and Secondary Ports**
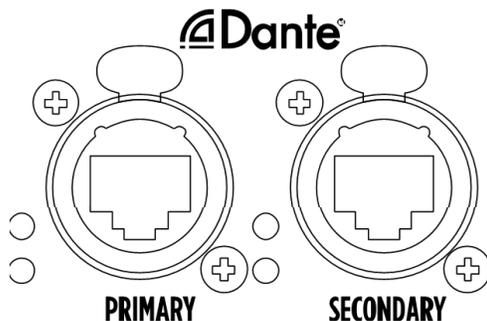
20.**Four digital signal output O1-O4** Stereo digital outputs on XLR connectors

21.**Power Output** two outputs on each speakon connector

Line Array Application Guide

Connections

Mains

⚠️ **WARNING! RISK OF ELECTRIC SHOCK.**

PROTECTING EARTHING TERMINAL. THE APPARATUS SHOULD BE CONNECTED TO A MAINS SOCKET WITH A PROTECTIVE EARTH CONNECTION! RISK OF ELECTRIC SHOCK.

1. Insert the power cord plug in the MAINS socket.
2. Turn the connector clockwise to lock it

CONNECTOR SPECIFICATIONS

NEUTRIK NAC3FC-HC

The PowerCon socket is used to disconnect the device from the main power source. It must therefore remain easily accessible after installation.
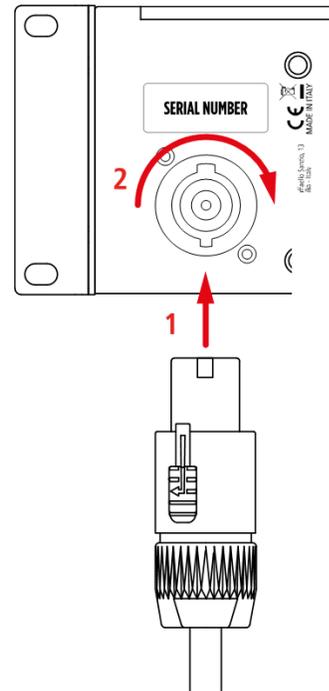
Analog Inputs A1-A4

- Pin 1 : Ground
- Pin 2 : A1 – 2 – 3 - 4 Signal +
- Pin 3 : A1 – 2 – 3 - 4 Signal -
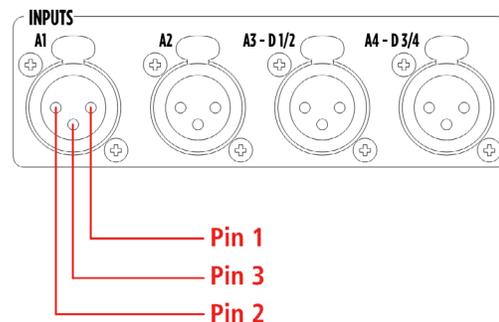
AES/EBU DIGITAL INPUTS D1/2 - D3/D4

- Pin 1 : Ground
- Pin 2 : D1/2 - D3/4 Stereo Signal +
- Pin 3   D1/2 - D3/4 Stereo Signal -
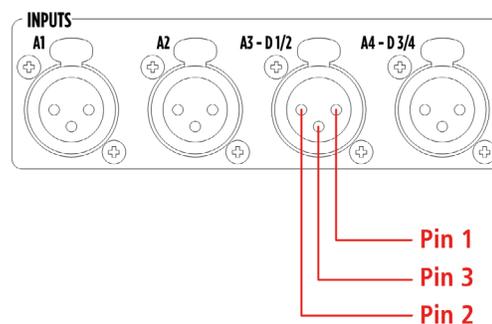
Line Array Application Guide

AES/EBU DIGITAL AUDIO LINKS O1/2 - O3/4

- Pin 1 : Ground
- Pin 2 : O1/2 - O3/4 Stereo Signal +
- Pin 3 : O1/2 - O3/4 Stereo Signal -
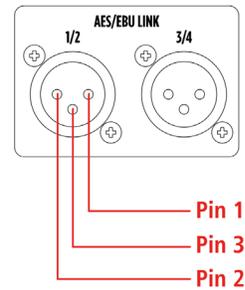
SIGNAL LINK BYPASS

UXA4416 implements two different DSP by-pass strategies between digital inputs and outputs.

Direct Mode

A firmware strategy that bypasses DSP in an active way, with signal regeneration and negligible delay.
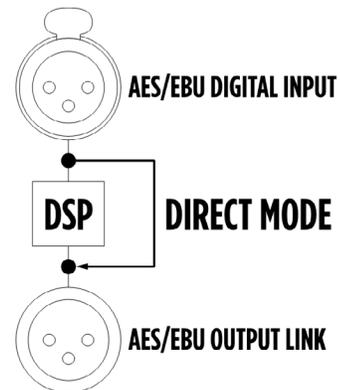
Relay Bypass

A hardware strategy that physically connects inputs and outputs by closing a n.o. relay in case of absence of power supply, in order to guarantee the integrity of the signal path.
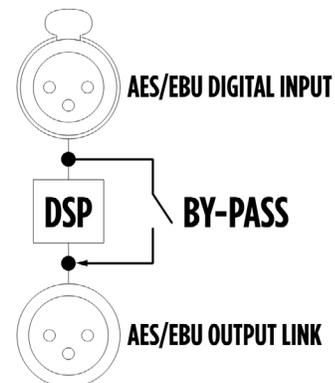
Outputs

⚠ **WARNING! RISK OF ELECTRIC SHOCK.**

⚠ **WARNING! CLASS 3 WIRING IS MANDATORY FOR THIS EQUIPMENT**

Line Array Application Guide

1+	Out A – Out C Signal +
1-	Out A – Out C Signal -
2+	Out B – Out D Signal +
2-	Out B – Out D Signal -

OUTPUTS
A 1+ 1- B 2+ 2-

⚠ **CLASS 3 WIRING**
CABLAGE CLASSE 3

C 1+ 1- D 2+ 2-
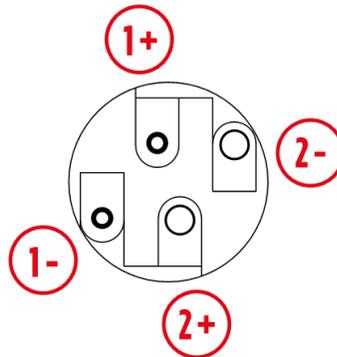
CONNECTOR SPECIFICATIONS

4-pole SPEAKON male connector.
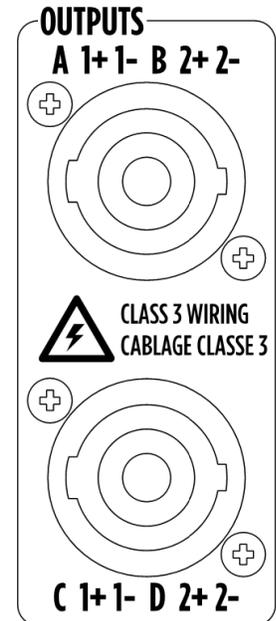
DANTE & Control

UXA4416 features 4 Gigabit Ethernet network ports, managed by a high-performance switch compliant with IEEE802.1. LAN ports 1 & 2 support EAW control protocols, while LAN Ports 3 & 4 support DANTE networked audio. In order to operate both control and DANTE, an ethernet cable will need to be conntected to each of the designated LAN ports. With implementation of the Brooklyn chip, redudant networking is an option and is recommended in most cases.

@Dante

LAN 1
LAN 2
PRIMARY   SECONDARY

Led 1

LAN 1   LAN 3   LAN 4
LAN 2
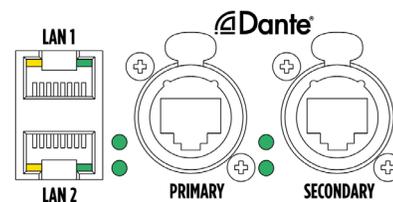
Led 2

Led 1 GREEN – flashing - link/activity

Led 2 YELLOW (LAN 1 and LAN 2) – GREEN (LAN 3 and LAN 4) – steady – device connected to a gigabit network.
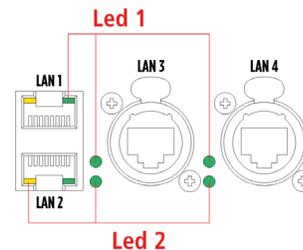
Line Array Application Guide

Daisy Chain Topology

Thanks to the internal switch, UXA4416 can be directly connected to an Dante network, and a daisy chain topology can be built when set in Dante Switch Mode. Accessing the Dante module using appropriate software (e.g. Dante Controller) it is possible to switch from the default connection mode "Switched" to "Redundant". Please refer to the Audinate documentation for connections and possible switch configurations.

The maximum number of devices that can be connected in daisy-chain depends on the specific user needs in terms of latency, that necessary increases with the number of units.

It is good practice not to connect more than 8 units in daisy chain.
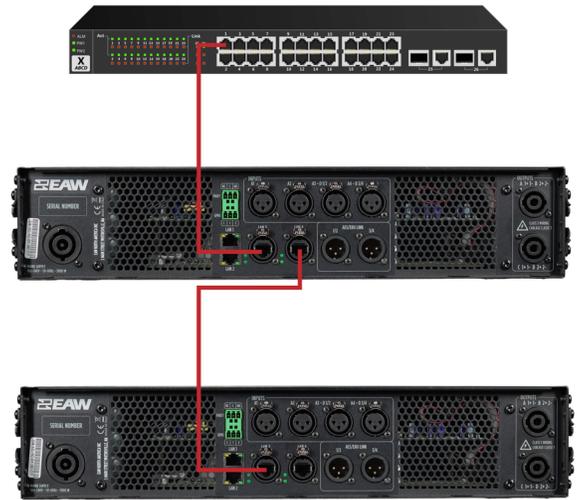
Redundant Networking

UXA4416 is equipped with a Dante Brooklyn Chipset. This allows for a Primary and Secondary network to be implemented concurrently. To configure Redundant networking an external switch is required. It can be connected to any of the 4 LAN ports of the device.

Each UXA4416 must be connected to a different switch port.

The maximum number of devices that can be connected in the same LAN is determined by IPv4 protocol.

A secondary switch or VLAN must be deployed and configured in a similar manner to another LAN port on the device.
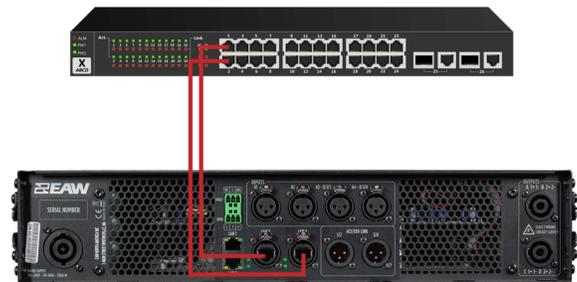
Line Array Application Guide

UXA4416 feature General Purpose Input and Output contacts to be connected with other systems, such as voice alarm systems.

GPIO Input

Two optoisolated contacts.

Operating modalities:
- Level: high or low
- Trigger: by rising or falling edge

Available Functions
- POWER ON: (amplifier switched ON at the selected level and switched OFF at the opposite, or toggle ON/OFF by the selected edge);
- SCENE RECALL: recalls a scene at the selected level or by the selected edge
- MUTE OUTPUTS: MUTE the selected output channels at the selected level and UN-MUTE them when the level changes, or toggle MUTE/UN-MUTE by the selected edge)
- INPUT OVERRIDE: enables the override input source at the selected level and disable it at the opposite, or toggle ENABLE/DISABLE by the selected edge.

GPIO Output

Two dry contacts.

Operating modalities:
- Normally Open (NO)
- Normally Closed (NC)

Available Functions
- FORCE INACTIVE: Forces normal condition (test function)
- FORCE ACTIVE: Forces opposite condition to the normal one (test function)
- OUTPUT CHANNELS FAULT: Enters the opposite condition to the normal one when ALL output channels are in fault condition

Fault

Two dry contacts. It warns of a unit's GENERAL FAULT. The details of the fault will be shown in the dedicated fault screen.

Operating modalities:
- Normally Open (NO)
- Normally Closed (NC)
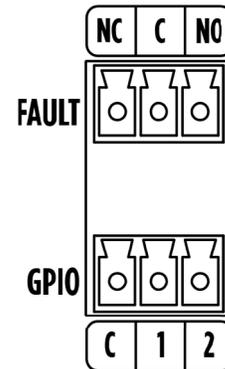
Line Array Application Guide

Going Online with UXA4416

Before going online, ensure the computer being used is connected to the same Ethernet network as the UXA4416.

When first opening Resolution, start by switching to Network Configuration View. This can be done by clicking the toolbar button or by selecting the Network Configuration menu item under the View menu.

To discover amplifiers on the network Resolution must connect to the network.

Start by clicking **Network > Connect**.
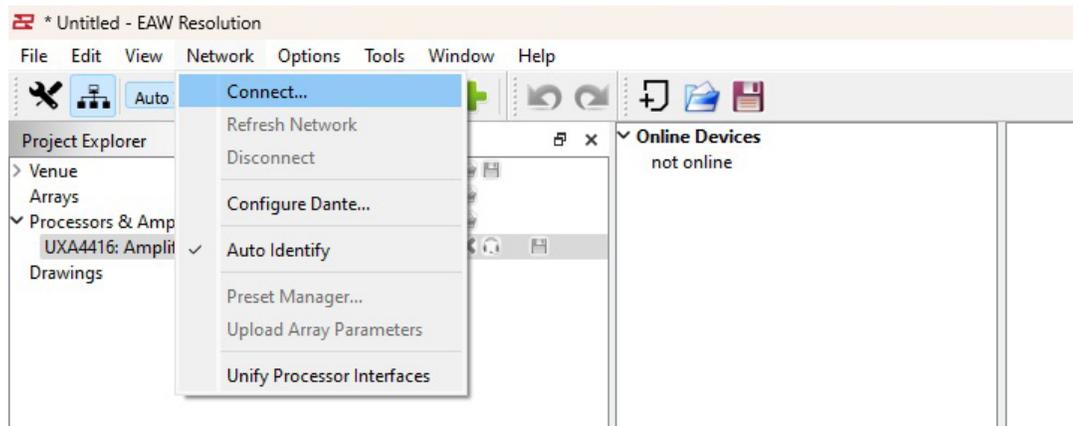
Line Array Application Guide

After a quick scan, all available products should now appear listed under **Online Devices**.
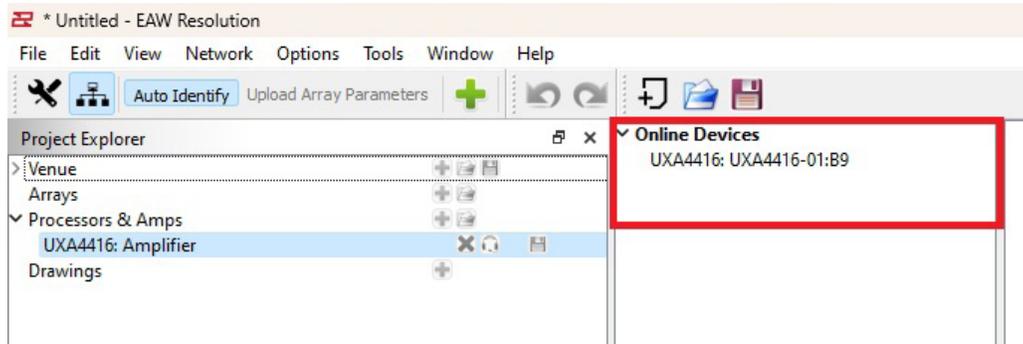
Adding an Online Device to Network Configuration View

There are two ways to Assign an online device to a network processor in the network configuration view.

The first method is to select and drag the Online Device then drop it into the network view area. This will create a new UXA4416 processor and pull settings from the amplifier into Resolution.

The second method is to create an offline UXA4416 amplifier, with default settings, and assign an online device to it. During assignment, the online and offline amplifiers settings are compared. If the settings differ then a dialog is shown to prompt the user to either push settings to the online amplifier (reset to defaults), or pull settings from the amplifier.

Adding an Offline Amplifier

To add a UXA4416 to the system, click on the "+" symbol next to Processors & Amplifiers in the Project Explorer window.
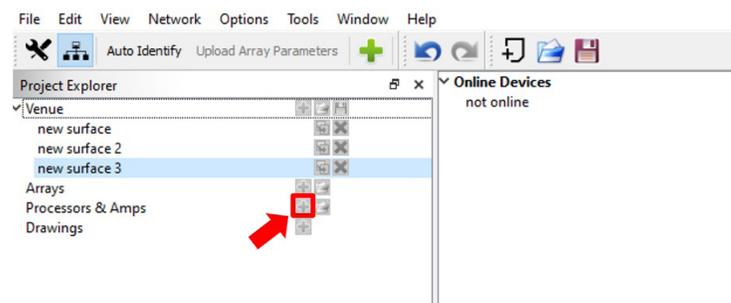
Line Array Application Guide

Upon being prompted, choose the "Amplifier UXA4416" product from the list.

A name for this amplifier can also be entered here.

Click "OK" once complete.
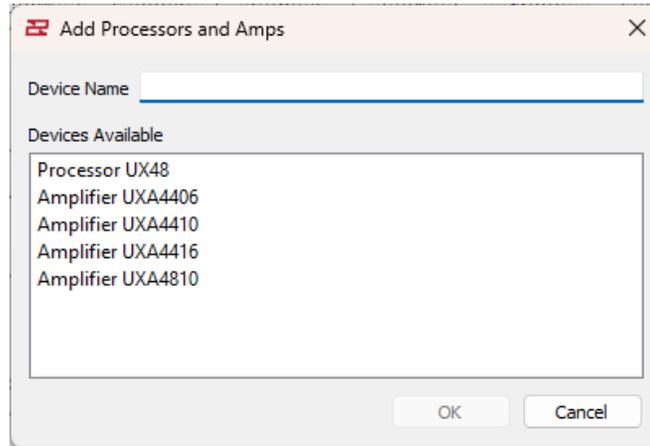
The offline UXA4416 will be added to the model, showing up in the network view area and added to the Project Explorer list.
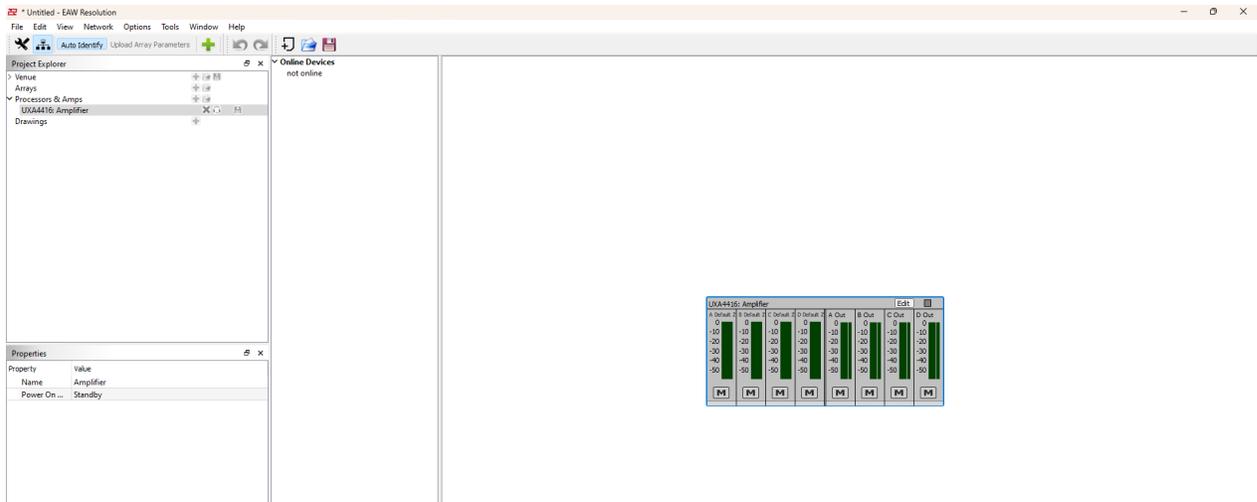
Assigning an Online Device to an Offline Amplifier

As mentioned earlier, when you create an offline amplifier, it is initialized with default settings. These settings can be modified by the user, saved, and loaded from a file. When assigning an online device to this offline amplifier, Resolution will need to determine which amplifiers settings to use.

To assign an online device to the network processor, Right-Click the network processor and select the Assign menu item. Another drop down menu will show a list of available devices that match the product type of the amplifier. Select the amplifier you wish to assign.
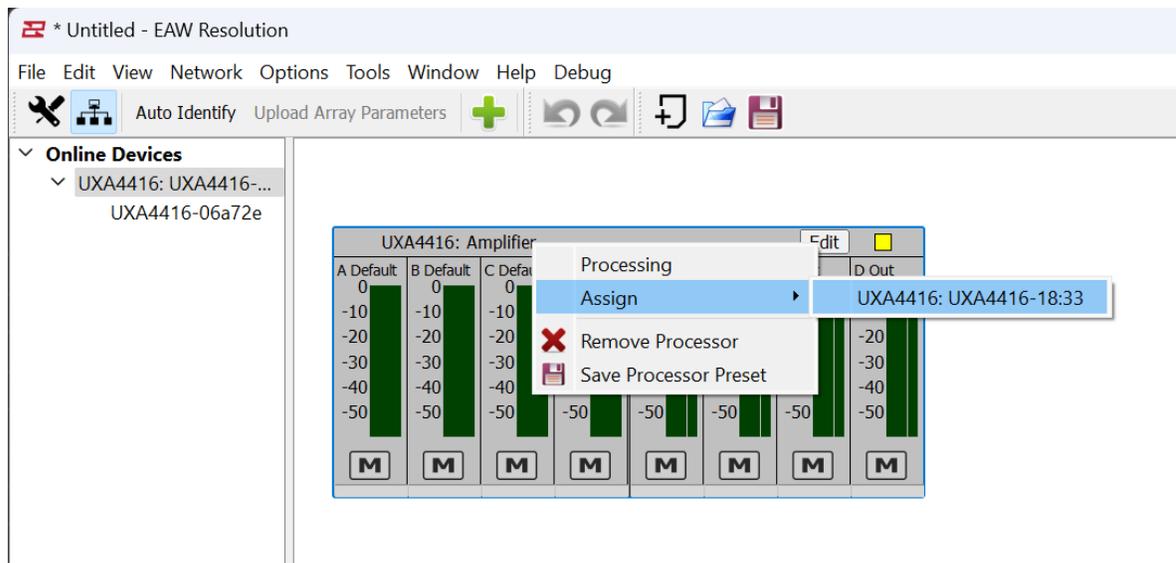
When the amplifier is assigned, Resolution compares the settings between the online and offline amplifiers. If the settings differ, a dialog pops up asking if the settings on the online device (Pull) or the offline amplifier in the Network View area (Push) should be used.
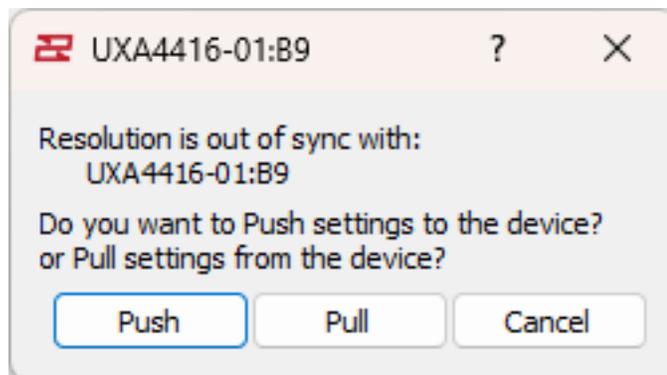
If Push is selected, then the local settings in the Network View amplifier will be sent over the network to the physical amplifier to replace its settings. If Pull is selected then settings from the physical amplifier will be read and will overwrite the settings on the local Network View amplifier. Both devices will now be in sync. If Cancel is selected then no settings will be overwritten and the two amplifiers will not be connected.

Line Array Application Guide

At this point, the device is online and ready to use in the system (as indicated by the green light).
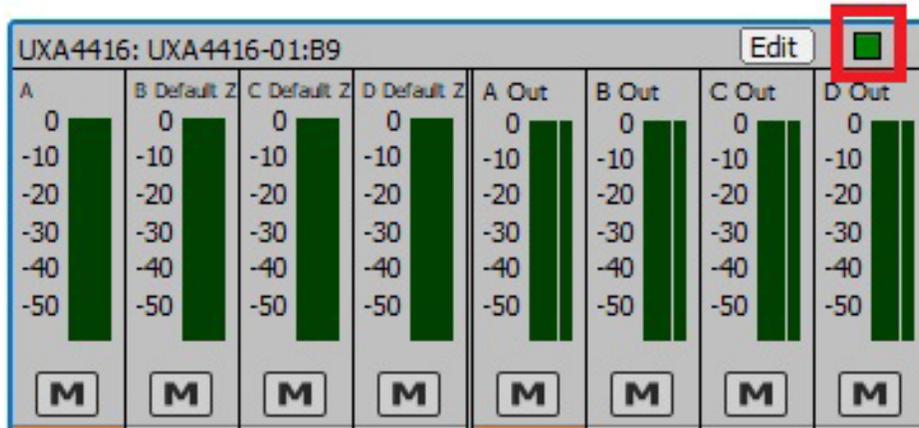
Assignment Problems

In some cases, Push or Pull may not be possible. This can happen if the firmware on the amplifier is too old and the Network View amplifier contains settings that are not available on the amplifier. This can be resolved by upgrading the firmware.

It may also be possible that the settings, such as speaker models, stored in an old file are not available with the latest firmware. Try editing the offline amplifier. Or, try adding the online device and choosing options that are similar to the old settings.

Line Array *Application Guide*

UXA4416 Input & Output Configuration
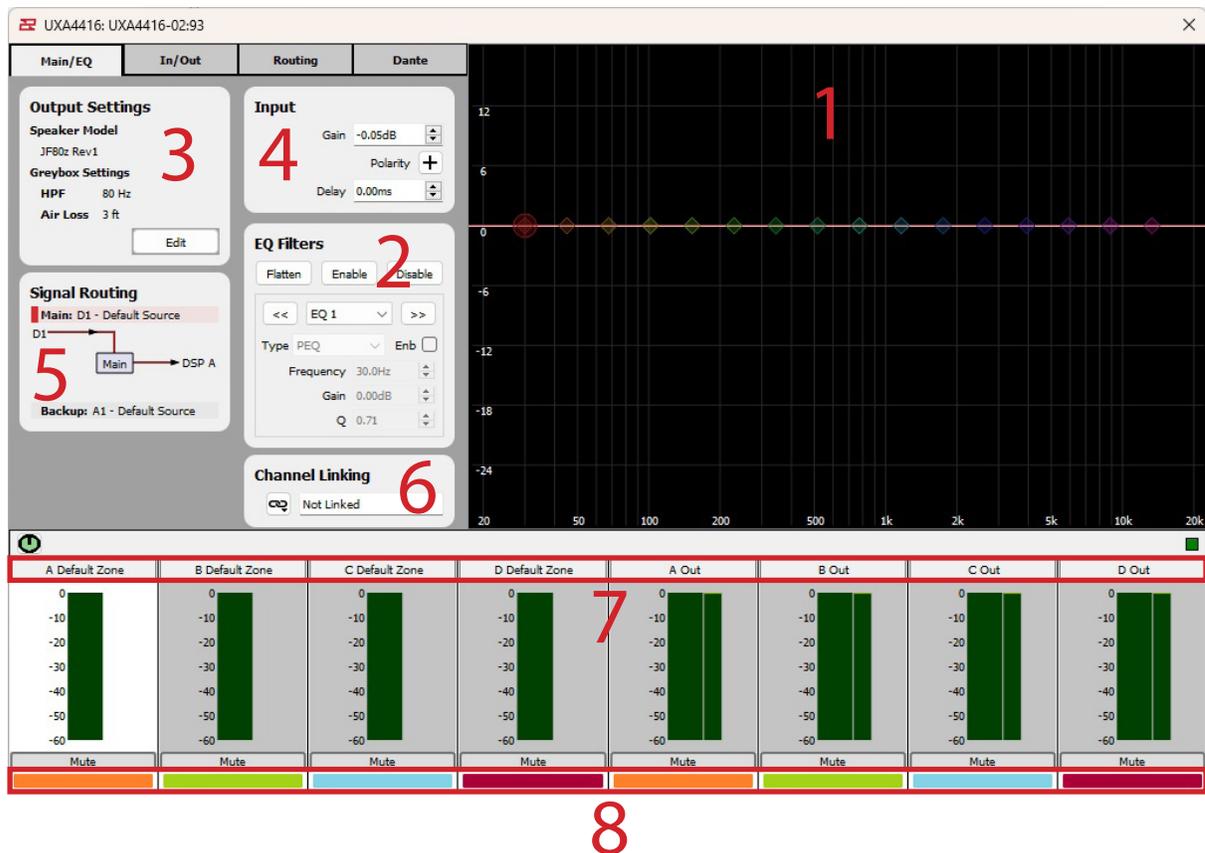
1. **EQ/Filter Graphic Window:** Allows click and drag of PEQ and Shelf filters. These filter types are configurable in the EQ Filters section. Each EQ band will need to be enabled manually. Once a Greybox is loaded, only the HPF may be modified.

2. **EQ/Filters Section:** Manually adjust settings for EQ/Filter bands. Use << , >> buttons to navigate from one band to the next. Individual filters may be converted between PEQ and Shelf. Additional buttons include Enable/Disable all filters, and Flatten that will evenly space each filter over the frequency spectrum at 0dB.

3. **Output Settings:** Choose a speaker model for the amplifier channel, and modify the supported settings. Channels must have a speaker model assigned in order to be useable.

4. **Input:** Adjust gain and delay, with an option to invert polarity per channel.

5. **Signal Routing:** Shows the current signal routing for the channel. The currently selected signal will be highlighted red, and shown in the diagram. Signal routing can be configured on the Routing tab.

6. **Channel Linking:** Channels can be linked together such that changes to specified controls -- EQ, gain, mute, delay, invert -- will be sent to all members in the channel linking group.

7. **Input & Output Channels:** Signal meters and channel labels. To change a channel label, double click on the default letter/number and type in a friendly name. ***NOTE: Output channels are locked by design as all configuration occurs within Greybox.***

8. **Input/Output Color Indicators:** The colored bars at the bottom of the meter bank show the association between input and output channels.

Line Array Application Guide

Loading Greyboxes

To assign a Greybox to a channel on the UXA4416, first select an input channel, then click the Edit button under **Output Settings**
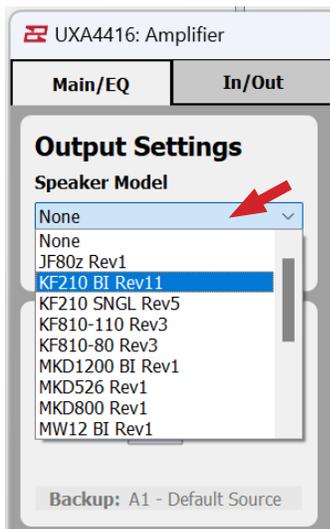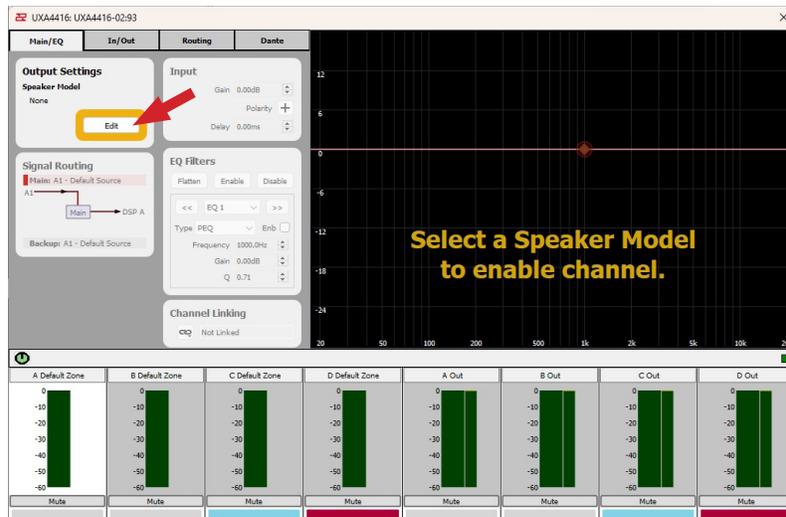
Make a product selection under **Speaker Model**.

BI amp greyboxes will, generally, be noted as BI in their name, and will require two channels as either AB or CD.

If the new greybox will affect a channel that already has a greybox defined, then a warning dialog will be shown. When selecting a new speaker model, all EQ and input settings will be reset on the affected channels.
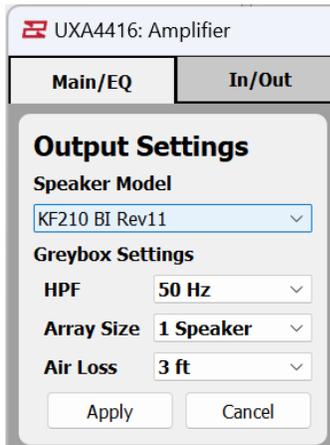
Once a speaker model has been chosen. A number of options will become available for modifying the sound.

Usually, these settings include HPF, Array Size, and Air Loss. Additional options include Voicings and a Speaker Model refinement if the greybox is designed for a speaker family.

Click **Apply** when finished.

Line Array Application Guide

Once the greybox has been applied, **Output Settings** will show the current greybox and the audio meters will show which channels are affected by the new greybox.

Here, a BI amp greybox has been applied on channels AB. The input meters are combined into one, and the title now indicates AB. The color labels on the bottom show input channel AB and output channels A (LF Out) and B (HF Out) in orange, indicating they are tied together.
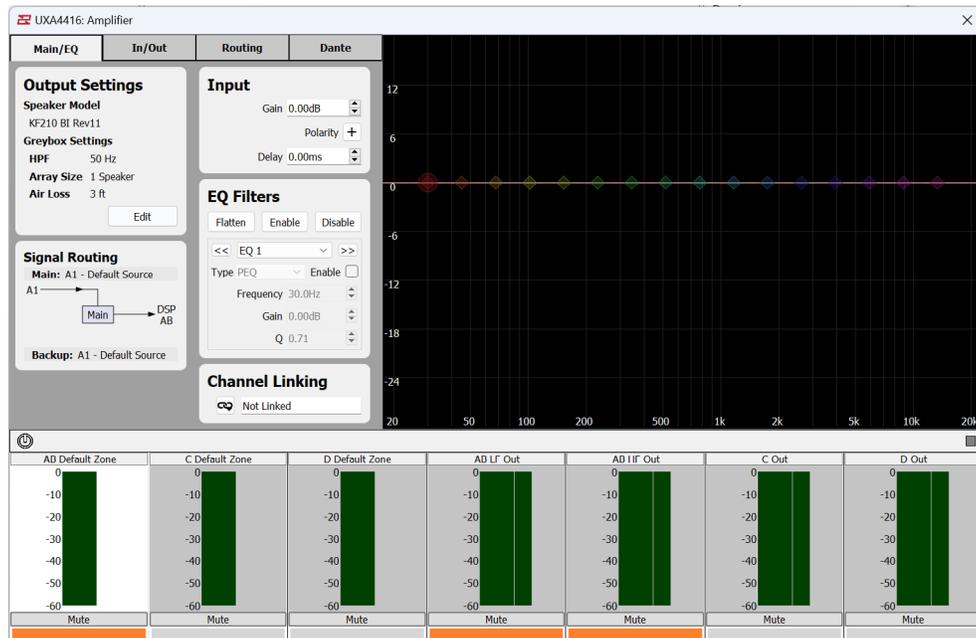
Note that if a BI amplified greybox is loaded, both input channels will be joined. (AB & CD). Inputs A & B correspond to the top NL4 connector on the amplifier back panel, whereas C & D correspond to the bottom connector.

Line Array Application Guide

Input Configuration Tab

Configure **Inputs/Outputs** once Greybox has been configured
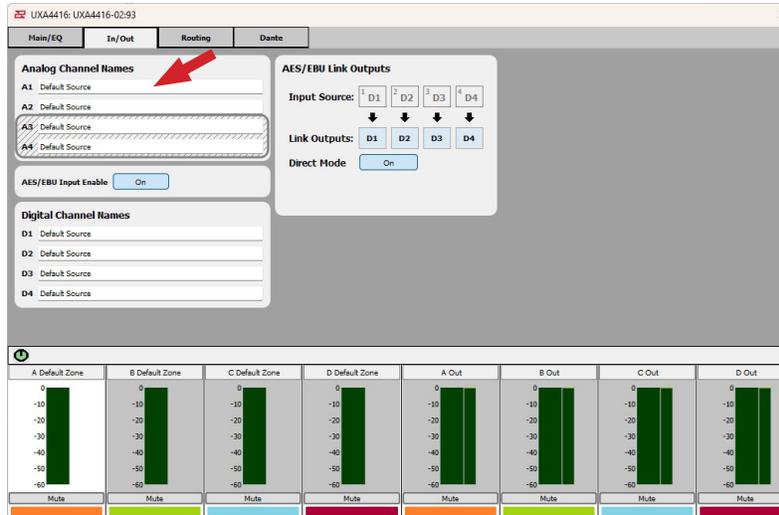
When using Analog, ensure that AES/EBU enable is turned off. Inputs A1-A4 will be available and selectable in the routing section. Digital inputs D1-D4 will be greyed out, as not available, since they share the same connector as Analog A3-A4.shown as greyed out
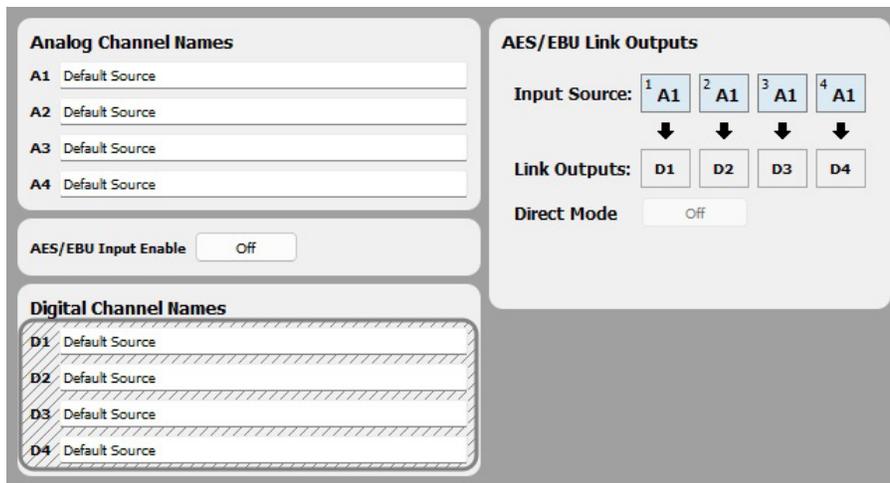
Line Array Application Guide

When **Enable Digital AES/EBU** is enabled, this allows for inputs D1-D4, disabling A3-A4 for these digital assignment options.

Under **AES/EBU Link Outputs** it's possible to assign an input source to a digital output. On the Input Source line, select a signal to send to the corresponding digital output.

Line Array Application Guide

Direct Mode overrides the Input Source selection and sends digital D1-D4 to outputs D1-D4.ends the digital inputs D1-D4 directly to the digital outputs.
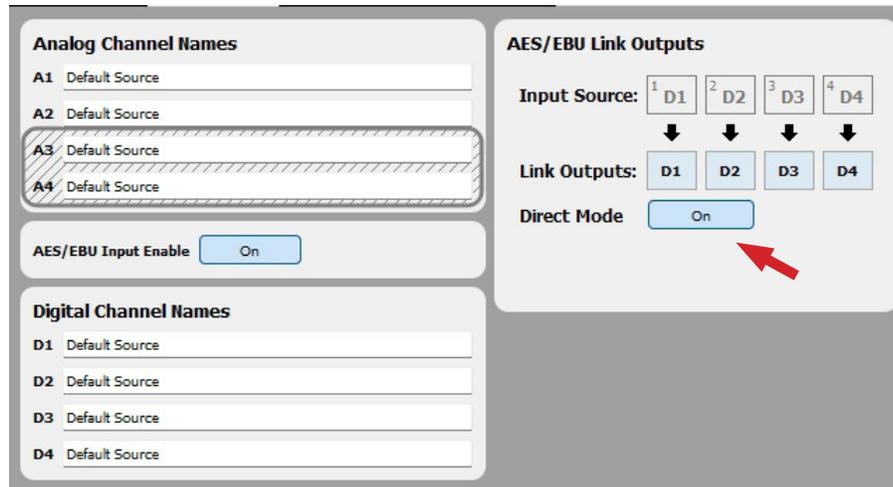
Dante Configuration Tab

Click on the Dante Tab to assign inputs to available Dante channels
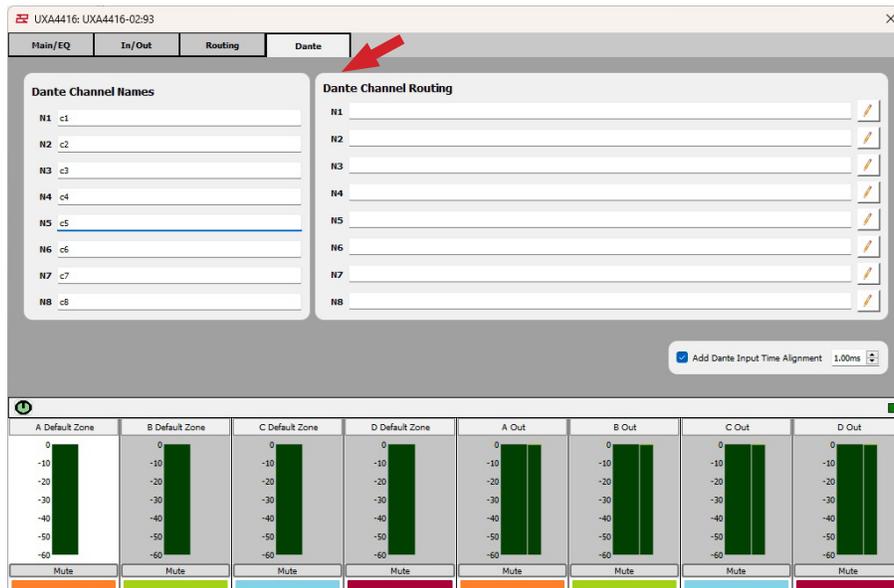
Double click under **Input Name** to rename the input, then select an available channel by clicking on the pencil edit button next to the Dante Channel dialog.
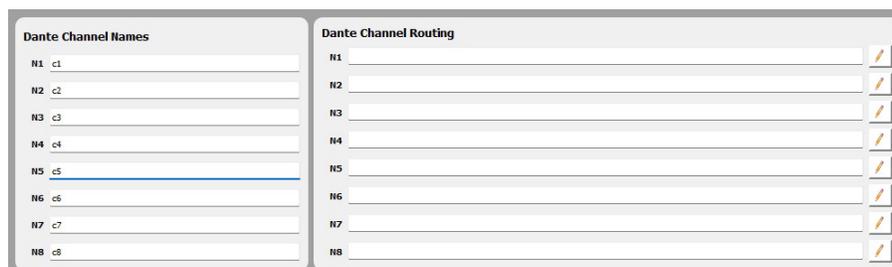
Line Array Application Guide

Signal Routing Configuration Tab

Assign **Signal Routing** once a Greybox has been configured (Assign a main and back up input)
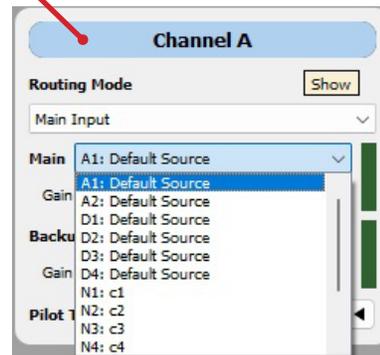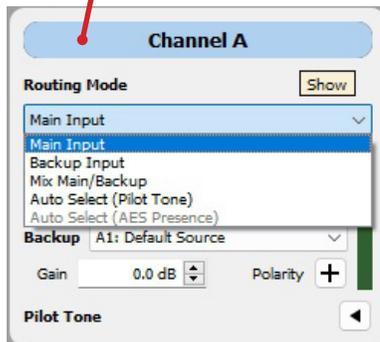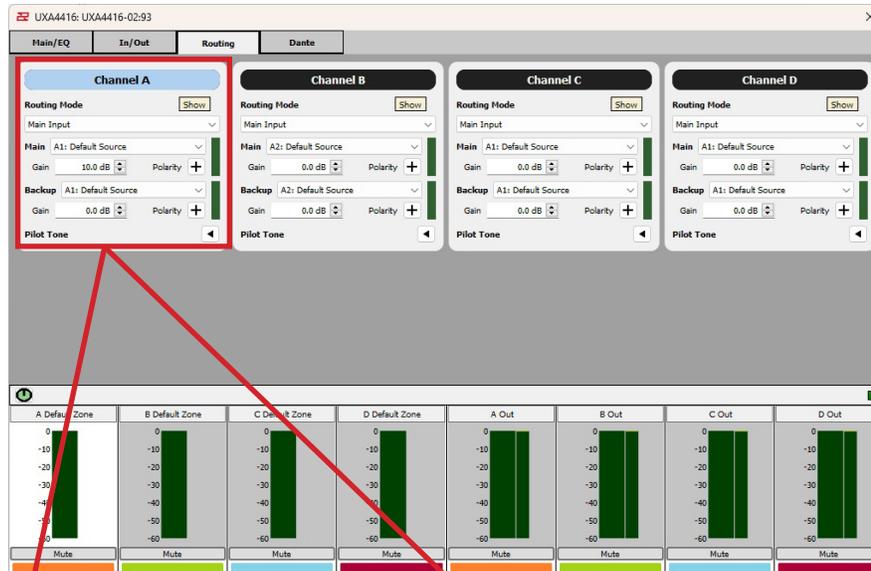
Routing Mode selects the method for choosing the input source to be supplied to the DSP input.

- Main
- Backup
- Main/Backup
- Auto Select (Pilot Tone) – select the main input if sound is detected at the user specified level.
- Auto Select (AES Presence) – select the main input if an AES signal is detected. This option is only available when digital inputs are enabled and a digital input is selected on Main.

Main Input/Backup Input

- Select the input source. Digital inputs are available if AES/EBU is enabled on the In/Out tab. If a Dante card is installed then additional Dante input channels will be selectable.
- The gain and polarity of the input source can also be adjusted here.

Channel A

Routing Mode [Show]

Main Input

Main	A1: Default Source
Gain	0.0 dB	Polarity [+]
Backup	A1: Default Source
Gain	0.0 dB	Polarity [+]

Pilot Tone [▼]

Threshold	Release
-90.0 dB	2 s
Frequency	Q
10 Hz	0.10
	Notch Filter ☐
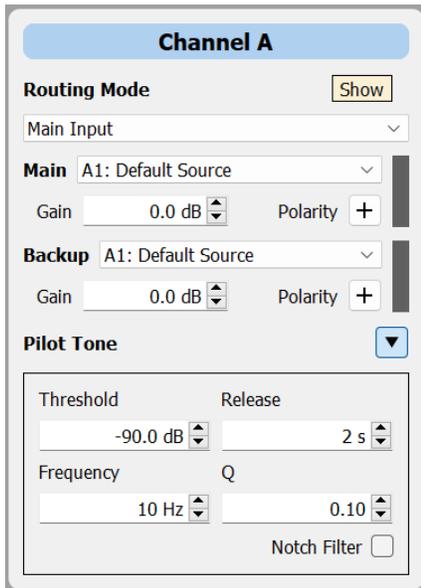
Pilot Tone

- The pilot tone is defined by sampling the Main Input to detect a minimum signal level (Threshold) over a specified amount of time (Release). The tone is further isolated around the specified Frequency and Bandwidth (Q).
- A Notch Filter is also provided to further isolate the signal to a specific frequency and bandwidth (Q).

Audio Meters

The Main and Backup inputs show audio meters to the right of the input selection. These are useful for confirming that signal is present between -60 and 0 dBFS.

Signal Routing Diagram

The Signal Routing diagram provides a visual representation of the input audio signal flow. Click the **Show** button beside the Routing Mode selection for the channel. When online, the diagram shows the currently selected input (thick red line) based on the Routing Mode setting. Audio meters are also shown at sample points along the signal flow.

UXA4416: UXA4416-18:33 ✕

| Main/EQ | In/Out | Routing | Dante |

Channel AB

Routing Mode [Hide]

Auto Select (Pilot Tone)

Main	A1: Default Source
Gain	0.0 dB	Polarity [+]
Backup	A2: Default Source
Gain	0.0 dB	Polarity [+]

Pilot Tone [◀]

Main: A1 - Default Source

Meter Scale: 0/-60 dBFS

A1 +0.0 → Pilot ⇢ Auto → M → +3.0 → DSP AB

A2 +0.0

Backup: A2 - Default Source
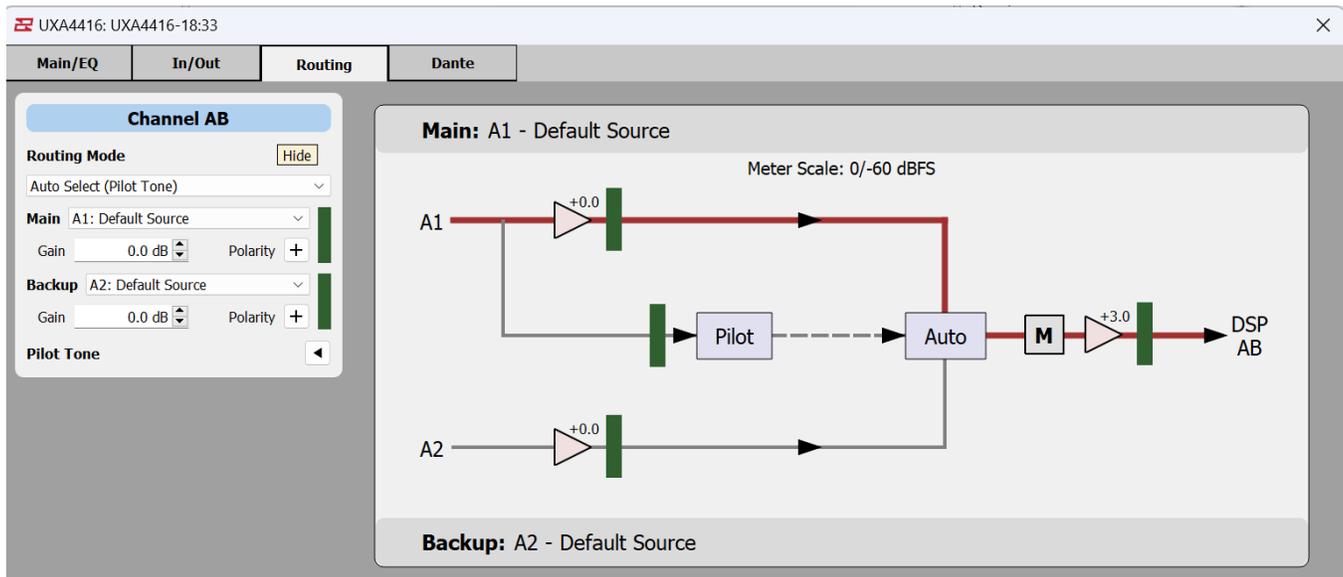
Line Array Application Guide
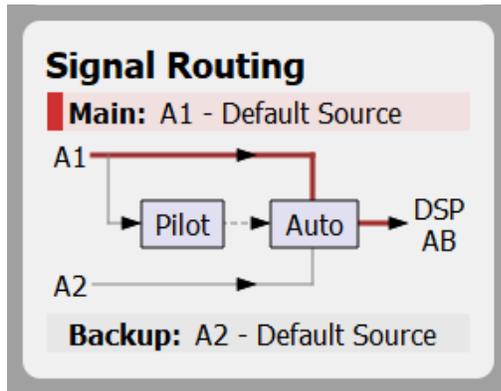
Small Signal Routing Diagram

A smaller version of the Signal Routing diagram can be seen on the Main Tab page. This diagram is for information only. It will show the currently routed signal Main/Backup by highlighting the title text.

Firmware Updates

Firmware updates are released with new versions of Resolution in the form of an EAWFW firmware update file. This file contains components for device firmware, speaker greybox library, and Dante firmware.

From the Tools menu, select **Firmware Manager**. This will open the Firmware Manager dialog which will display known devices on the network.

Click **Select File** and find the UXA4416 firmware update file. Any device in the list that can accept the firmware file will become selectable. Click the checkbox next to the UXA4416 amplifier.
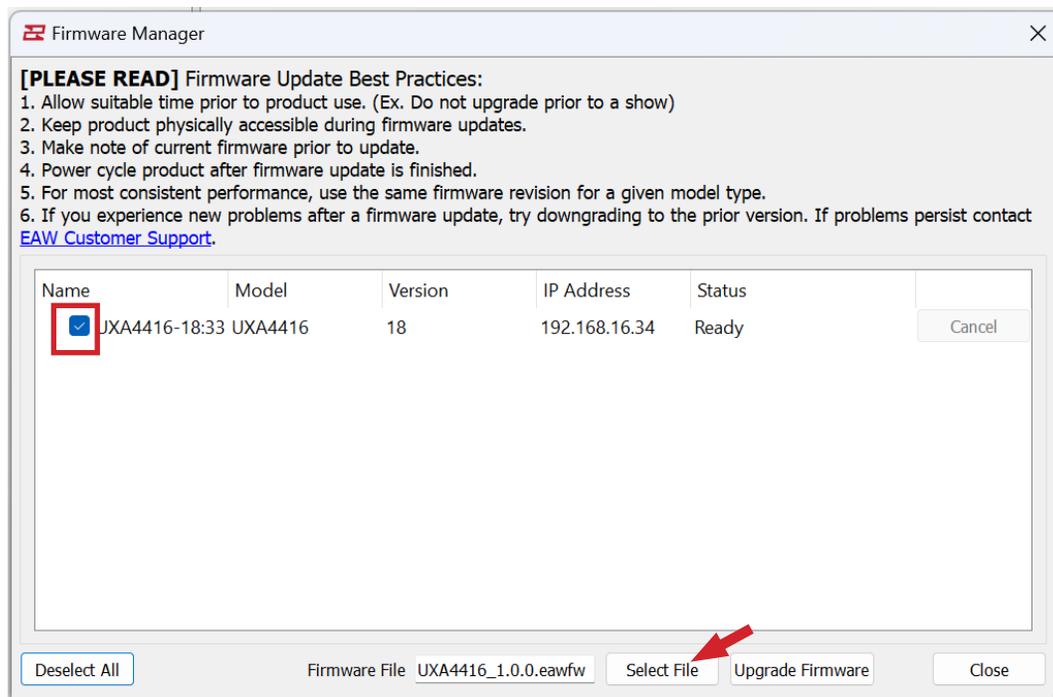
When you are ready to proceed, click **Upgrade Firmware**. Another dialog will appear asking for confirmation and will list the devices that have been selected for upgrade.
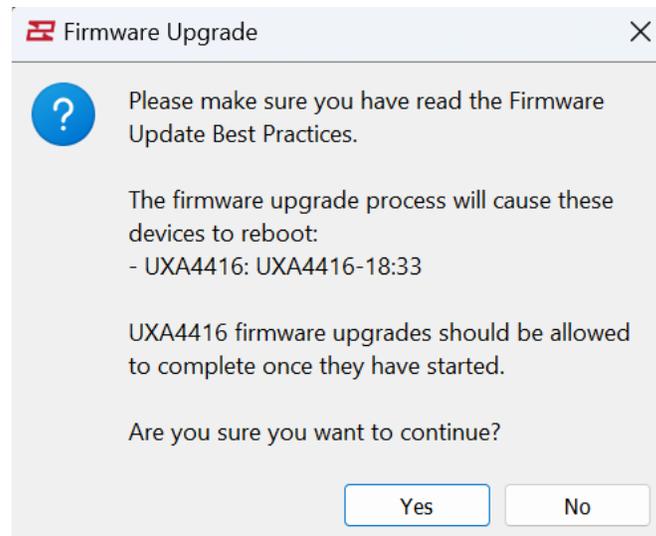
Please Read the best practices at the top of the Firmware Manager window before proceeding. It is always best to place devices on a DHCP network. The Dante connection should be placed on the same network as the control port. It is not a good idea to loop control ports through other amplifiers as the update process can cause the network connection to stop working, interrupting the connection to devices connected on that port.

After clicking Yes, the firmware update process will lock the amplifier so it can send files uninterrupted. Once the firmware update starts it should not be stopped. The green progress bar will proceed to 100% as it uploads a number of files. After the files have been sent, the update process will complete on the amplifier.
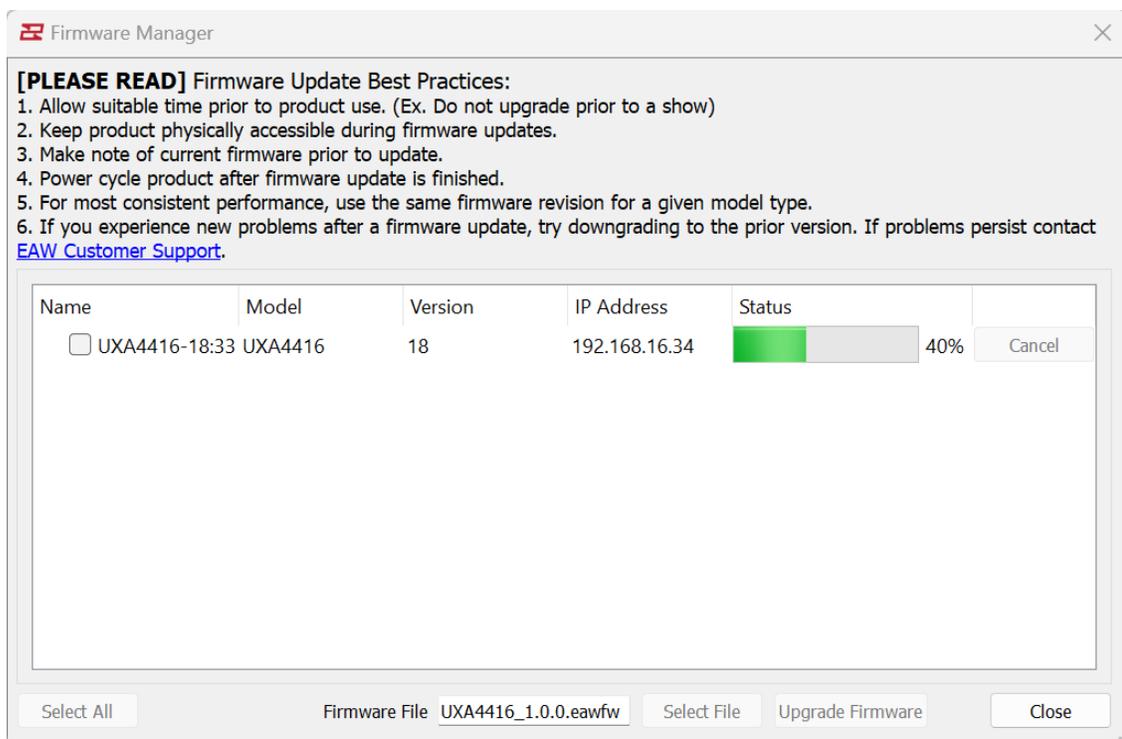
Resolution will indicate that an amplifier is being updated in the Online Devices list. It will be greyed out and show [Updating] after the name.

∨ **Online Devices**
> UXA4416: UXA4416-18:33 [Updating]

When the update process is complete, the amplifier will return to normal in the Online Devices list and will no longer indicate [Updating].

Troubleshooting It is possible that a problem can occur during the update process. This is most likely due to some sort of network interruption. The amplifier will remain locked out. When this happens, you must restart the firmware update process by selecting the update file and amplifier and proceeding with the update.

Line Array Application Guide

UXR Amp Racks

UXR custom-built amplifier racks are available in two models; UXR316 or UXR216. Each UXR amp rack comes with custom power, input, and output panels and is equipped with rigging making it possible to suspend one or multiple UXR amp racks.

Side rigging allows multiple side by side UXR amp racks to be secured together keeping the stage area clean and organized. Front mounted cabling allows the racks to be located against walls and stages, reducing the system's stage footprint and ensuring you always have fast physical and visual access to patching.

The UXR input panel provides all amplifier analog inputs and loops at the front of the amp rack. A high-quality Dante certified switch supports Dante signal routing inside the rack, between multiple UXR amplifier racks, and front of house. In situations when redundant digital networks are required a second switch can be added. The outputs of each amp are available on NL4 and NL8 connectors enabling exceptional output wiring flexibility.

TECHNICAL SPECIFICATIONS

RACK CONTENTS	
Amplification	2 or 3 UXA4416D 4x4000W
Network	1 or 2 Luminex GigaCore 10 switches
Connectivity	1 UXR Power Distro 1 UXR Audio Panel
Misc	3 or 6 1GB Cat 5e 4 AES jumper cables
POWER DISTRIBUTION	
AC Input / Link (US)	30A - NEMA L21-30 (3P+N+G) male / female outlet
AC Input /Link (EU)	32A - IEC 60309 (3P+N+E) male / female outlet
AC Presence	3x LEDs
AC Auxiliary output (US)	NEMA 5-15 (Front / Rear)
AC Auxiliary output (EU)	Universal (US UK EU) 3-prong (Front / Rear)
Protection	15A resetable (US) or 16A breaker (EU)
AC Output for UXA	3 x 32A PowerCON, 208V (US) or 230V (EU)
AC output for network	2 x 16A True1 PowerCON
CABLES	
Analog	6 AES compatible XLR, 4ft tail
Network	3 or 6 1GB Cat 5e, 2 ft tail
AES/EBU	4 AES/EBU jumper, 1ft
RIGGING & TRANSPORT	
Rigging Hardware	Integrated 2-point rigging
Flybar	2042596 Flybar Amp Distro Rack [FB Rack]
Caster Pallet	2072324 UXR Caster Pallet
Gang Bracket	2072493-90 UXR Gang Bracket Kit
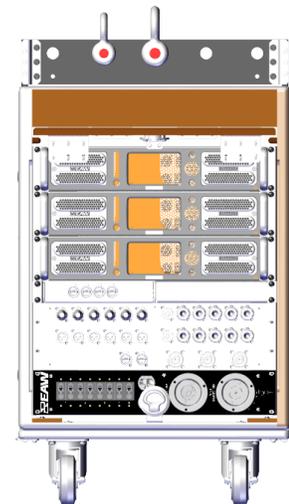
UXR FRONT PANEL VIEW

UXR REAR PANEL VIEW

Line Array Application Guide

UXR Amp Walk Thru

Primary Switch

Power Panel

UXA Amplifiers

Optional Secondary Switch

Audio Panel
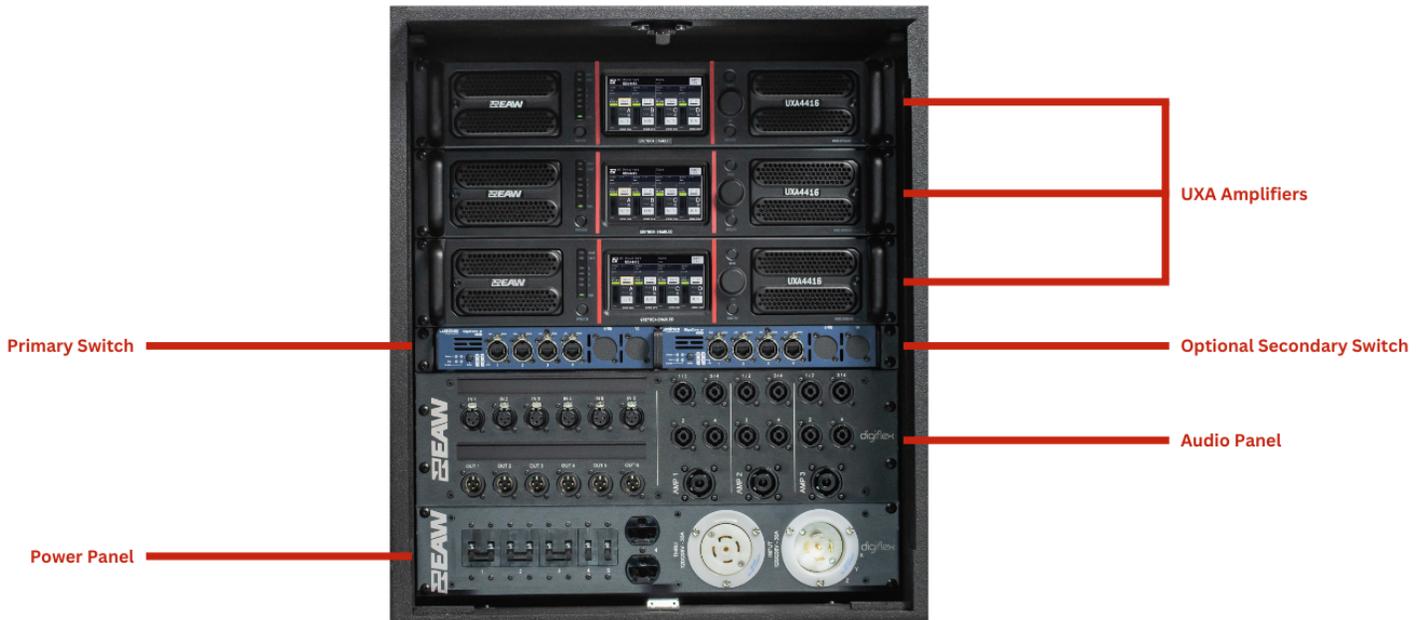
UXR316 shown with optional secondary switch

UXR Touring Rack Rigging

Each UXR Rack may be flown by utilizing a flybar with two suspension points. Line up the flybar rigging tabs into the top side rigging slots on the cabinet. Use the pins connected to the flybar to secure in place.

Using the same integrated rigging on the side of the cabinet, a second UXR amp rack may be flown under the first rack.
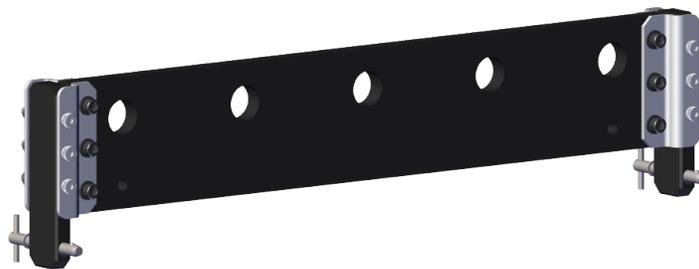
UXR Amp Rack Flybar

Line Array Application Guide

UXR Flybar deployed with Amp Rack

Using Gang brackets, UXR Racks may be connected and arrayed together to create an overall cleaner and organized look to deployments. These brackets are to be installed on the front and the rear of the cabinet.

Position the brackets on the inside edges of both racks. Line up the pin holes of the brackets with those on the cabinets. Secure by pinning the bracket to the racks.
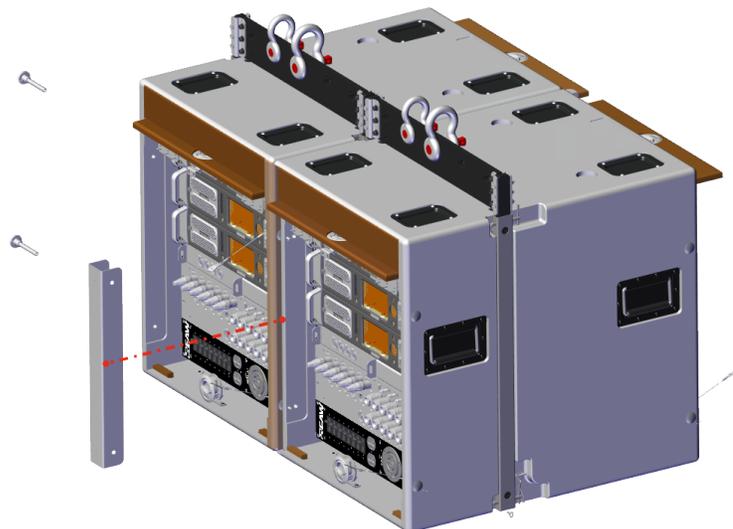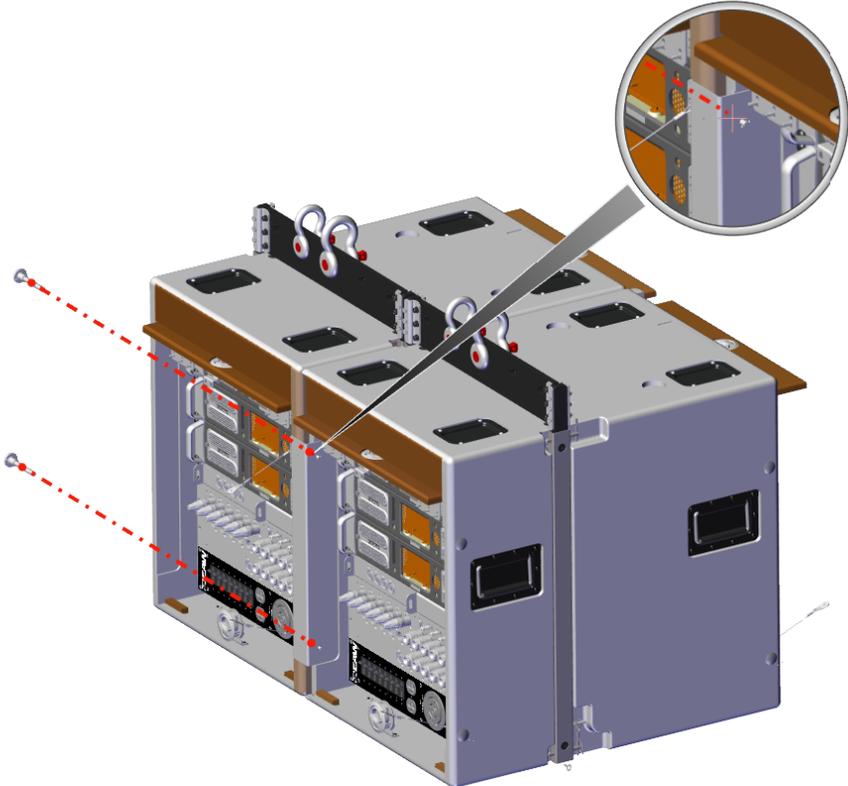
Securely pin the brackets to the rack
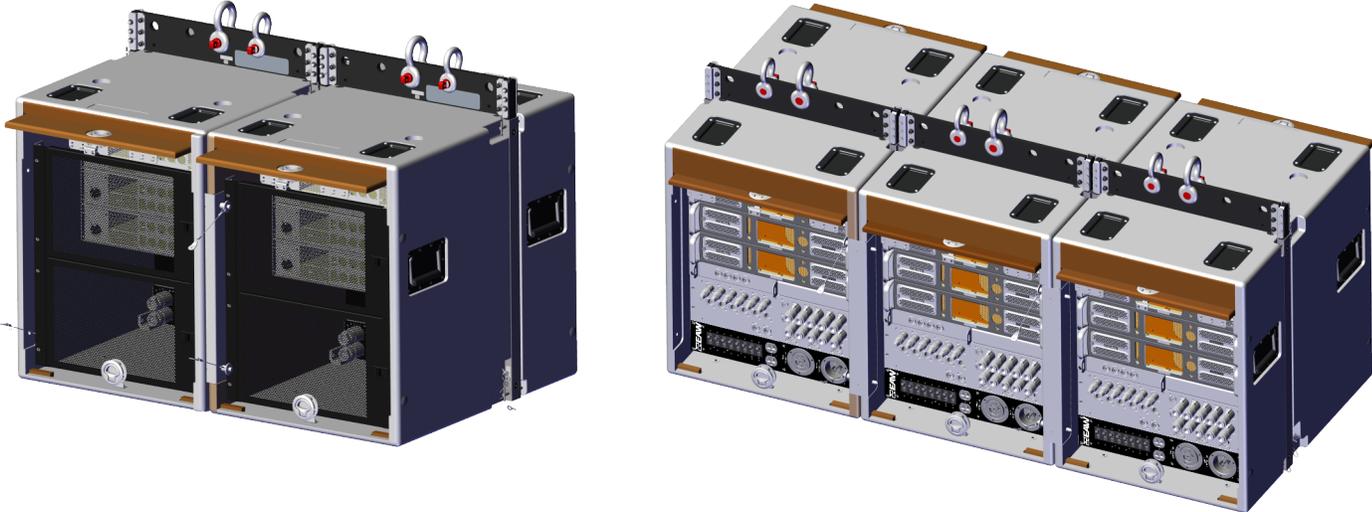
Gang plates shown here on both the front and rear of UXR Racks

Line Array Application Guide

Cabinet Rigging: Mounting/Suspension

DANGER: Mounting or overhead suspension of any heavy load can result in serious injury and equipment damage. This work should be done by qualified persons following safe rigging practices in accordance with all applicable safety and construction standards. Such persons must determine the required load ratings and design factors. They must determine the mounting or suspension method that meets static, dynamic, shock, and any other load requirements. All such work must be done in accordance with and in compliance with all federal, state, and local regulations governing such work.

CAUTION: The user assumes all responsibility and liability for the proper design, installation, and use of any rigging and mounting systems for EAW loudspeakers.

CAUTION: Accessory items are available from EAW and from aftermarket suppliers to facilitate suspension, wall, ceiling, or other rigging. When using these items, review all enclosed documentation and carefully follow all instructions and safety precautions.

Rigging Design Practices

Rigging a loudspeaker requires determining:

1. The rigging methods and hardware that meet static, shock, dynamic, and any other load requirements for supporting the loudspeaker.

2. The design factor for and the required WLL (Working Load Limit) for this support.

EAW strongly recommends the following rigging practices:

1. Documentation: Thoroughly document the design with detailed drawings and parts lists.

2. Analysis: Have a qualified professional, such as a licensed Professional Engineer, review and approve the design before its implementation.

3. Installation: Have a qualified professional rigger install and inspect the system.

4. Safety: Use adequate safety precautions and back-up systems.

5. Consider applying threadlocker to hardware per qualified professionals recommendation.

Rigging Hardware and Accessories

Rigging EAW loudspeakers will invariably require hardware not supplied by EAW. Various types of load-rated hardware are available from a variety of third-party sources. There are a number of companies specializing in manufacturing hardware for, designing, and installing rigging systems. Because of the hazardous nature of rigging work and the potential liability, engage companies that specialize in these disciplines to do the work required.

Line Array Application Guide

KF810P Flown Arrays with SB818P|F

- Attach stinger to the frame using 2x M10 bolts w/flat washers and lock nut. *NOTE: The stinger is reversible. Position per Resolution 2 software.*

STINGER

- Place flybar assembly on top of SB818P|F and use M8 X 30 bolts w/flat and lock washer to rig front and rear positions.
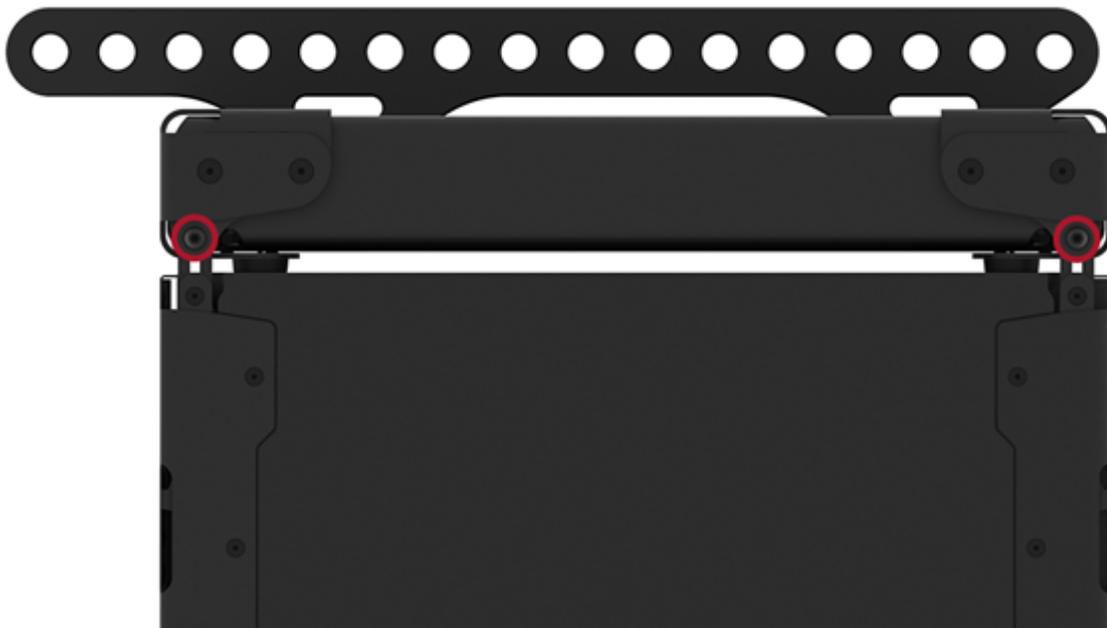
Line Array Application Guide

- Attach shackle (¾") to desired stinger position and raise array. Use Resolution for optimal position.

- Place second SB818P|F on surface underneath array and lower to attach using M8 X 22 threaded bolts w/flat and lock washer to front and rear rigging.

- Repeat to use desired SB818P|F amount in array (See Resolution for array limitations).

- To attach a KF810P, start by attaching frame to bottom of SB818P|F array.

- Do so by laying the frame on a surface, then lowering SB818P|F array and attach using M8 X 22 bolts w/flat and lock washer to rig front and rear positions.

    NOTE: Orientation of KF810P adapter "Z" hole needs to be located to the rear of the array.

Line Array Application Guide

- Raise array and place first KF810P array item underneath, then lower array to KF.

- Using M8 x 30 bolt w/flat and lock washers to secure front rigging, then M10 bolt w/flat washers and lock nut to secure rear rigging using hole "Z".
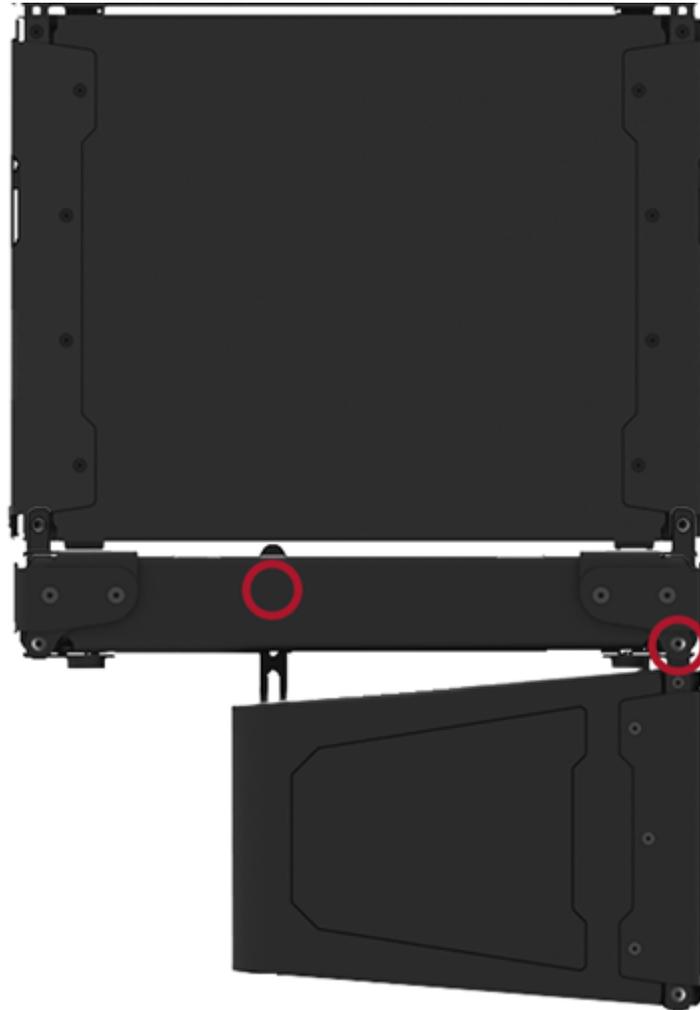
- To connect a second KF810P, repeat the same process but with M8 X 22 threaded bolt w/ flat and lock washers on front rigging. Repeat this process to use desired KF810P amount in array (see Resolution for array limitations).

Line Array Application Guide

KF810P Flown Arrays without SB818P|F

- Attach stinger to the frame using 2x M10 bolts w/flat washers and lock nut. *NOTE: The stinger is reversible. Position per Resolution 2 software.*

STINGER

NOTE: Orientation of KF810P adapter "Z" hole needs to be located to the rear of the array.

- Place flybar assembly on top of KF810P and use M8 X 30 bolts w/flat and lock washers to rig front position.

- Select 0 deg ("Z") position on rear rigging and use M10 bolt w/flat washers and lock nut to secure.
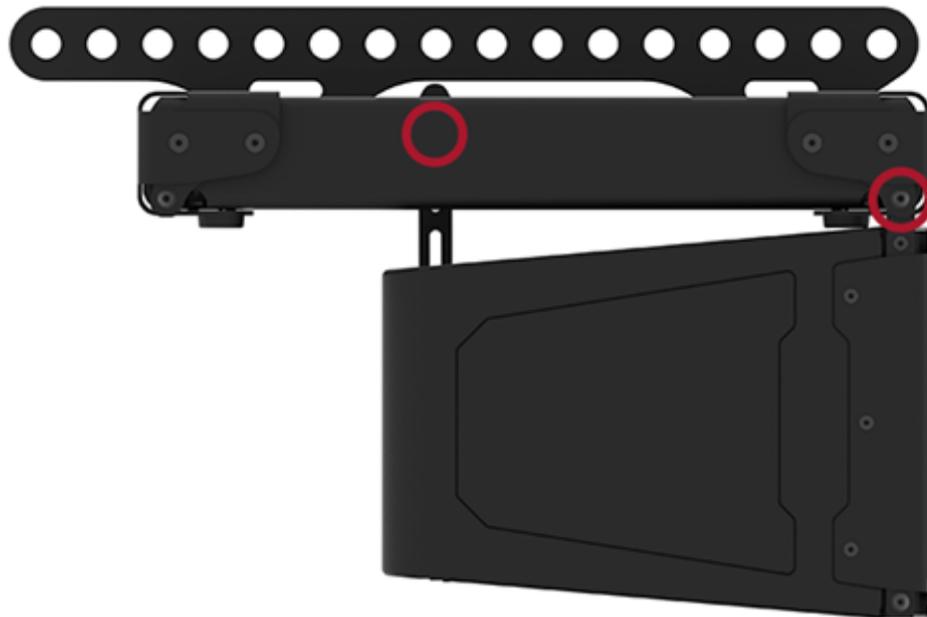
- Attach shackle (¾ ") to desired stinger position and raise array (Use Resolution for optimal position).

- Place second KF810P on surface underneath array and lower.

Line Array Application Guide

- Using M8 x 22 bolt w/flat and lock washers to secure front rigging, then M10 bolt w/ flat washers and lock nut to secure rear rigging angle (See Resolution for angle).
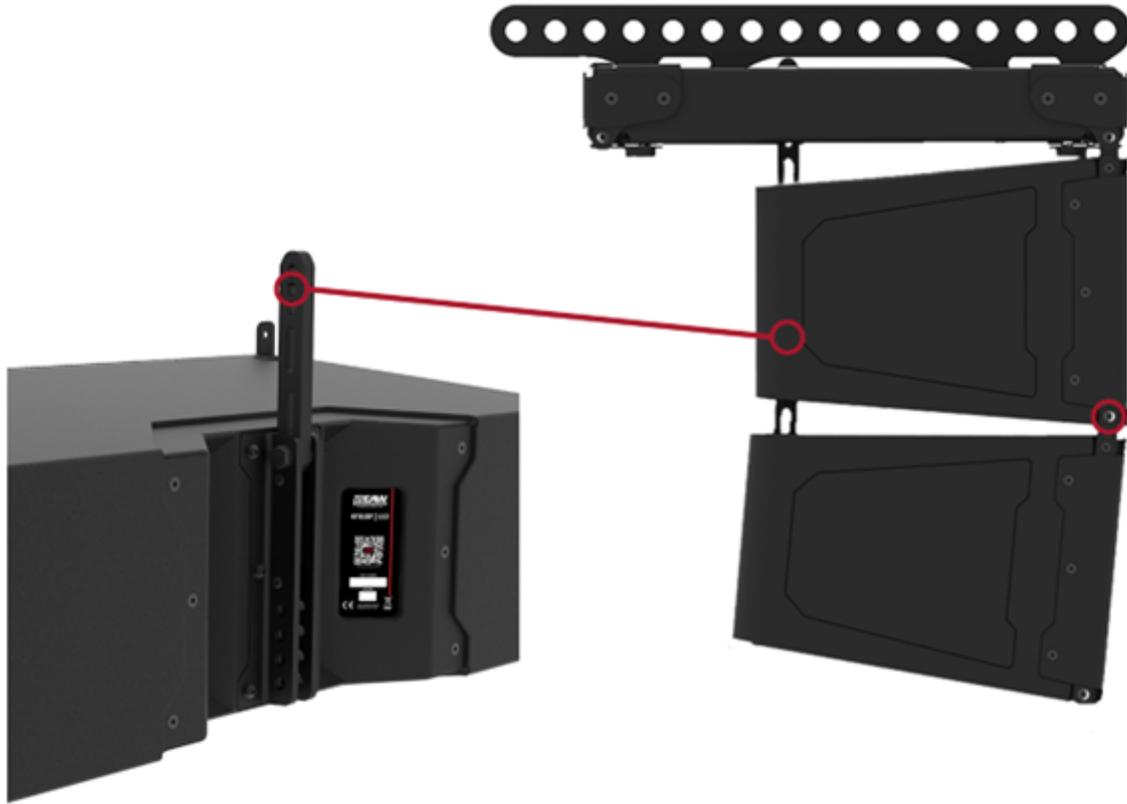
- Repeat to use desired KF810P amount in array (See Resolution for array limitations).

Ground Stacking Procedures

WARNING: *Ground-stacked arrays, especially the maximum recommended arrays, requires assembly by personnel qualified to ensure adequate stability from tip over for the particular application. See Section 6 for correct array assembly. Mechanical assistance will be required to lift and position enclosures for arrays taller than approximately 5 feet.*

NOTE: *Low Frequency performance is often highly program or venue-dependent, as well as subjective as to quantity and quality. For this reason, the type, quantity, and disposition of subwoofers may vary considerably with the application. The quantity recommendations below are for general purposes, providing a balanced system for most music applications. Quantities may need to be adjusted up or down for specific situations.*

Line Array Application Guide

KF810P Ground Stack with SB818P|F

- Place your SB818P|F on the ground.

- To attach additional SB818P|F, lift on top of SB818P|F beneath and use M8 x 22 bolts w/ flat and lock washers to secure front and rear rigging (See Resolution for ground-stack limitations).

- To add KF810P, start by placing frame on top of SB818P|F array, and securing front and rear rigging with M8 x 30 bolts w/flat and lock washers. "Z" hole needs to be orientated towards the front of intended array.

- Place the first KF810P on top of frame, and secure front rigging with M8 x 22 bolts w/flat and lock washers (See Resolution for ground-stack limitations).

Line Array Application Guide

- Using the rigging arm on the frame, choose splay angle between frame and KF810P (refer to ground-stack chart on adapter frame or review in Resolution), and secure rigging with M10 bolt w/flat washers and lock nut.
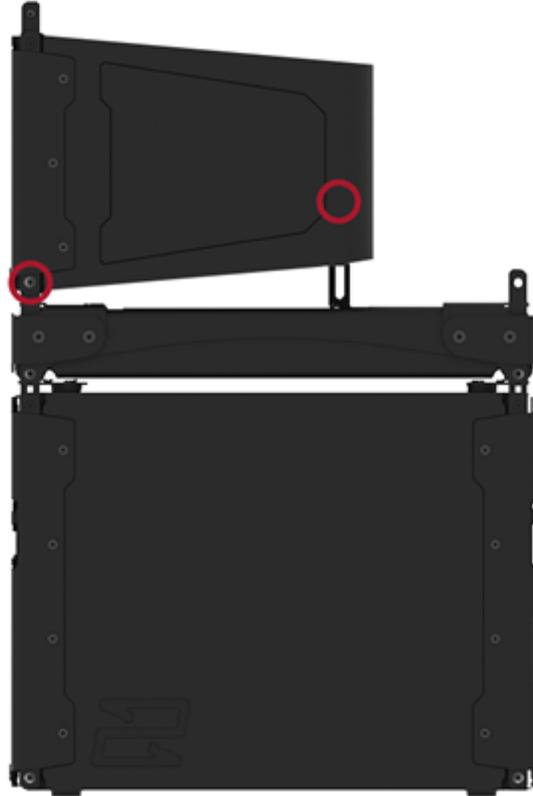
- Repeat this process to add additional KF810Ps, with rigging arm on KF810P beneath (See Resolution for ground-stack limitations).

    NOTE: Refer to chart on KF810P rigging or Resolution for KF810P to KF810P rigging angles.

KF810P Ground Stack without SB818P|F

- Place frame on the ground. "Z" hole needs to be orientated towards the front of intended array.

- Place the first KF810P on top of frame, and secure front rigging with M8x22 bolts w/flat and lock washers.

Line Array Application Guide

- Using the rigging arm on the frame, choose splay angle between KF810p and frame (refer to ground-stack chart on adapter frame or review in Resolution), and secure rigging with M10 bolt w/flat washer and lock nut.
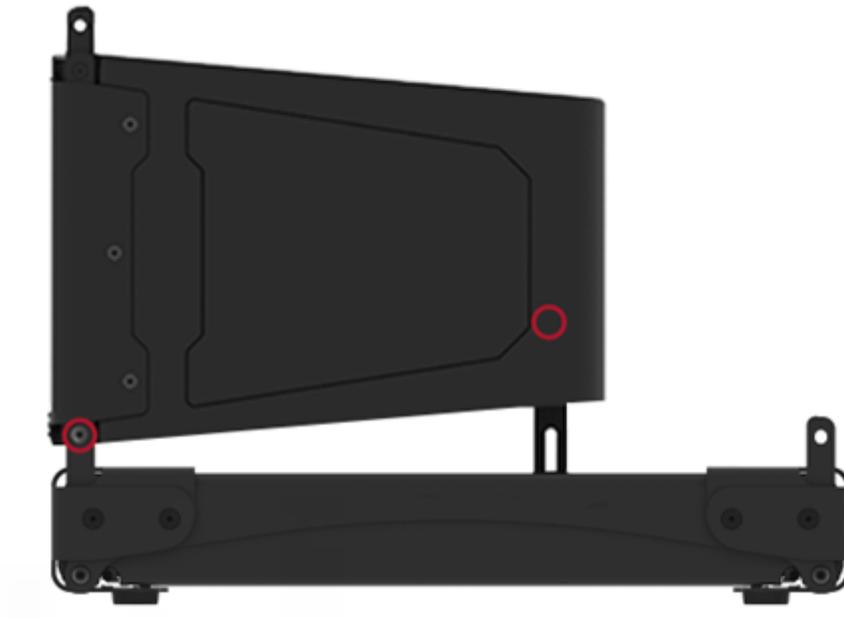
- Repeat this process to add additional KF810Ps, with rigging arm on KF810P beneath (See Resolution for ground-stack limitations).

    NOTE: Refer to chart on KF810P rigging or Resolution for KF810P to KF810P rigging angles.

Line Array Application Guide

Rigging KF210

The assembly of two KF210 modules can be done following the steps below:

- On the first module, remove the pins [3], raise the retractable brackets [2] and fasten them to the new position using the pins [3].

- Remove the pins [1] from the second module, place it on top of the first module, inserting the brackets [2] as shown. Then fasten the front side of the two modules using the pins [1] of the second module.

- On the back, remove the pins [5] from the rear brackets [4]. Then insert the movable arm [6] of the second module into the bracket [4] of the first module. The next page shows in detail the fastening of the angle on the rear between the two modules.
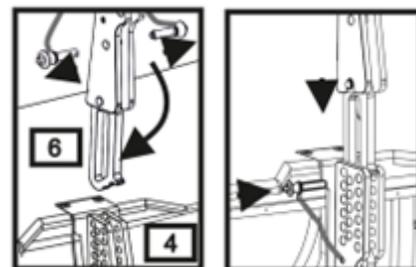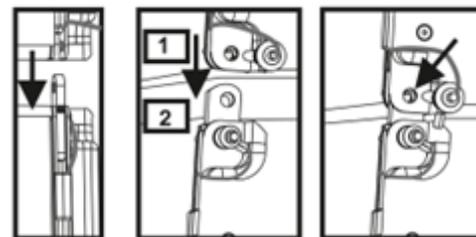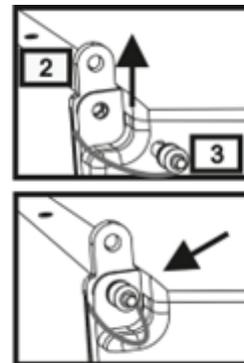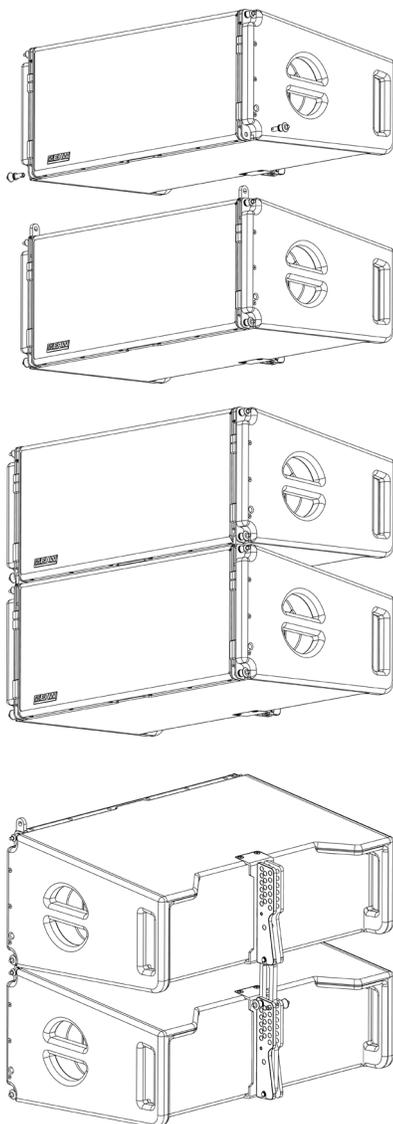
Line Array Application Guide

The below example explains two cases in which you want to set a specified angle between two modules using the rear rigging. Before carrying out any other operation, make sure that once the movable arm is inserted [6], the hole of the chosen angle is contained inside the loop as shown.

- **FLOWN CASE:** insert only one pin in the hole on the chosen angle. The second pin can be housed in the "PIN HOLDER" hole. Note that this type of configuration during the assembly allows changing the chosen angle simply by moving the respective pin (with the movable arm inserted).

- **STACKED CASE:** once the pin [5] is inserted into the hole of the chosen angle, lift module B as far as the movable arm [6] allows. At this point, insert the second pin into the "ANGLE LOCK" position and release module B. This way, module B is completely blocked by the two pins on the rear.

After assembly is completed, always make sure that all the pins have been completely inserted and are locked.

Rear Rigging Assembly Plate

Line Array Application Guide

For quick installation, the following optional accessories can be purchased:

- Fly-bar for the flown and stacked use for line arrays of KF210 modules.

- A cart to transport up to 4x KF210 modules.

KF210 Flybar
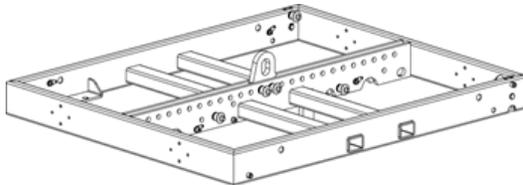
KF210 Flybar using one shackle or pick points
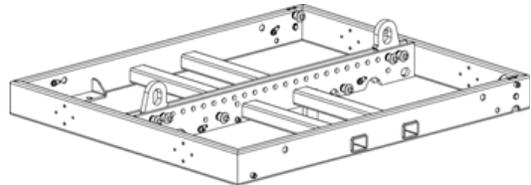
KF210 Flybar using two shackles or pick points

The assembly of an KF210 module to an KF210 Flybar can be done following the steps below:

- Connect to single or dual shackles and raise shackle enough to fit KF210 module underneath comfortably.

- Raise rigging ears on KF210 and align to flybar holes.

- Insert front rigging pins on both sides.

- Align and lock into place rigging plates on flybar to rear rigging assembly on KF210 module.
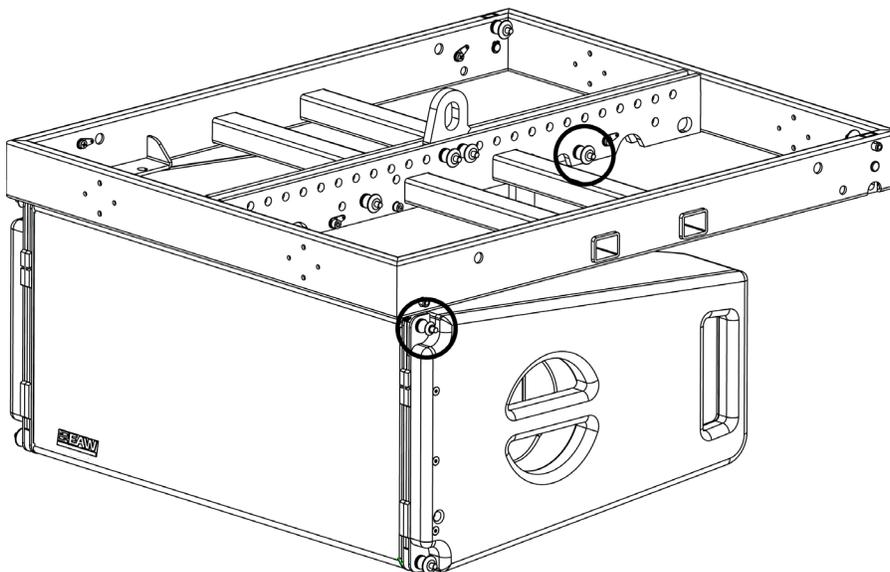
Line Array Application Guide

KF Series Ground Stack Adapter

Ground stacking of an KF210 cabinet with an SB818 subwoofer is possible using the groundstack adapter by following the steps below:

- Place SB818 subwoofer right side up on stable surface.
- Line up groundstack adapter with the rear rigging positions of the SB818 and pin in place using pins from the groundstack adapter.
- Line up KF210 with the front rigging positions of SB818 and pin it into place using rigging pins from the KF cabinet.
- Using the three-point rigging, set splay angle and pin on the groundstack adapter (See below)

PH (5)	PH (0)	PH (-2.5)	PH (-5)	PH (-7.5)

Pin Holder Label

2072403-90 (A)

AL (-3)	AL(-1.0)	AL (0.7)	AL (2.5)	(N/A)

2072402-90 (A)
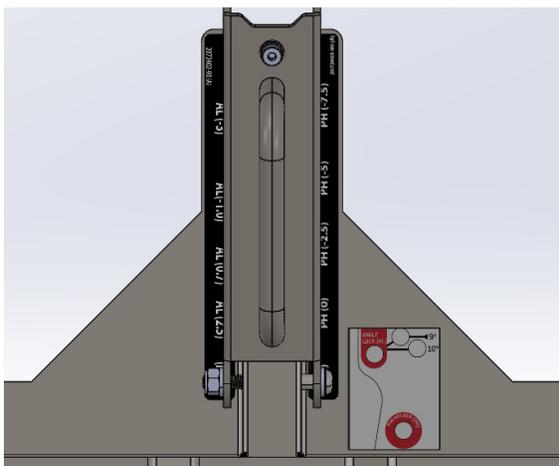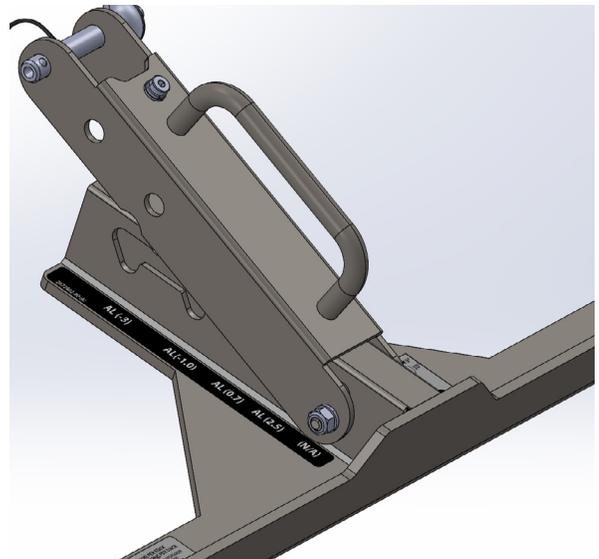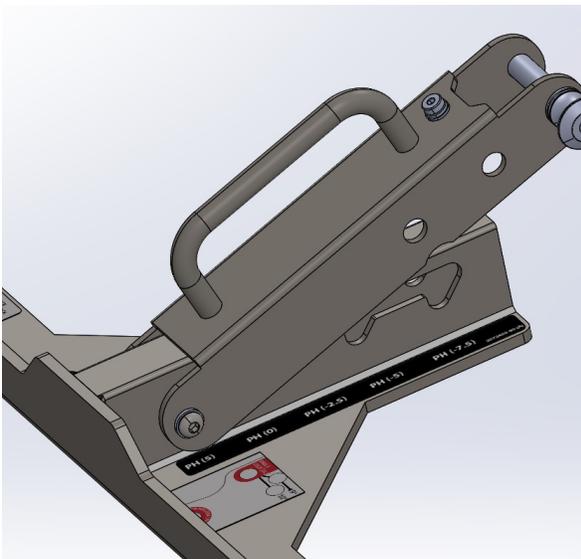
Angle Lock Label
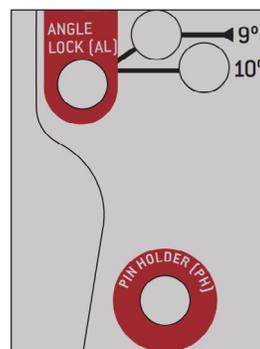
Pin Locater Label

Line Array Application Guide

• Pin KF210 using pin on the groundstack adapter to secure cabinet to rigging.
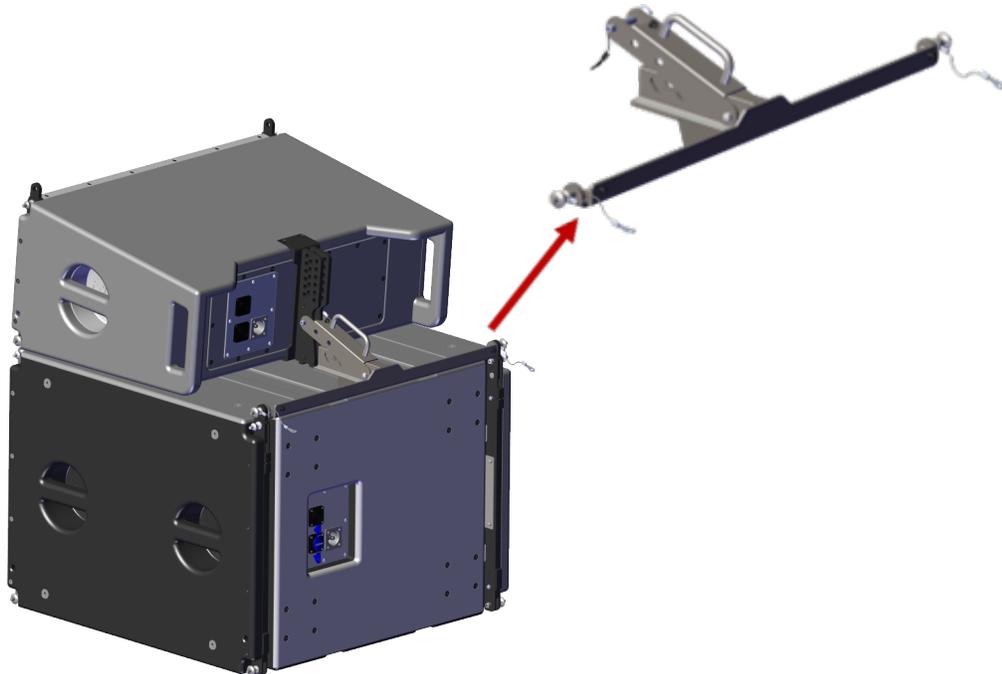
KF Series Array Transition Bar

To array an SB818 subwoofer with KF210 line array loudspeakers, the KF Series transition bar is needed. Follow the steps outlined below to build the array.

• Connect the KF Series flybar to the first SB818 in the array using the 4 rigging points.
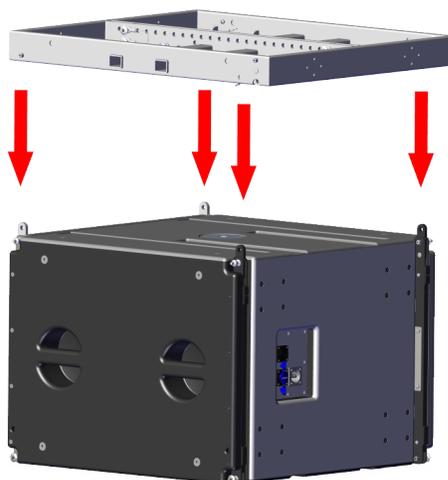
Line Array Application Guide

- Connect any additional SB818 using the same four rigging points as used previously by the flybar.
- To rig KF210 to array, start by pinning transition bar to the first KF210 and set splay angle using angle and locking pin.
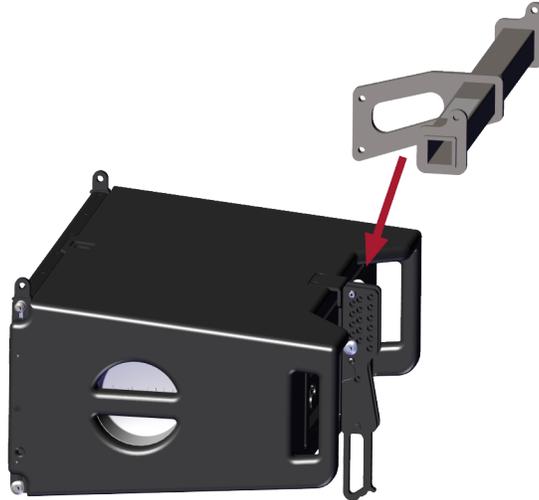
- Connect NTX210L to front points on the bottom of SBX118F, and the two transition bar rigging points to rear points.

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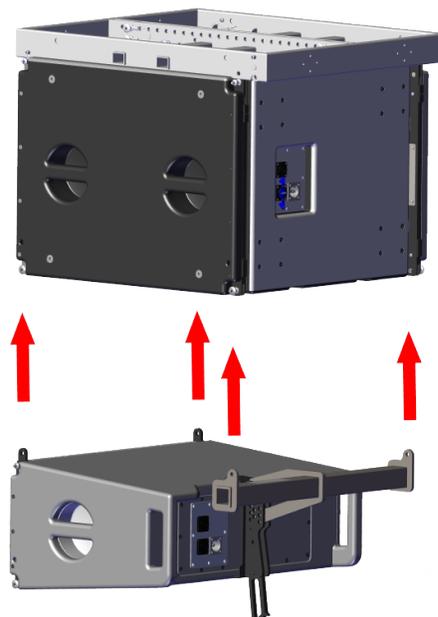
Line Array Application Guide

• Below is an image with a configuration utilizing both the SB818 flown by the flybar, as well as an KF210 with the transition bar. Additional KF line array cabinets may be added by following the steps outlined on page 49.
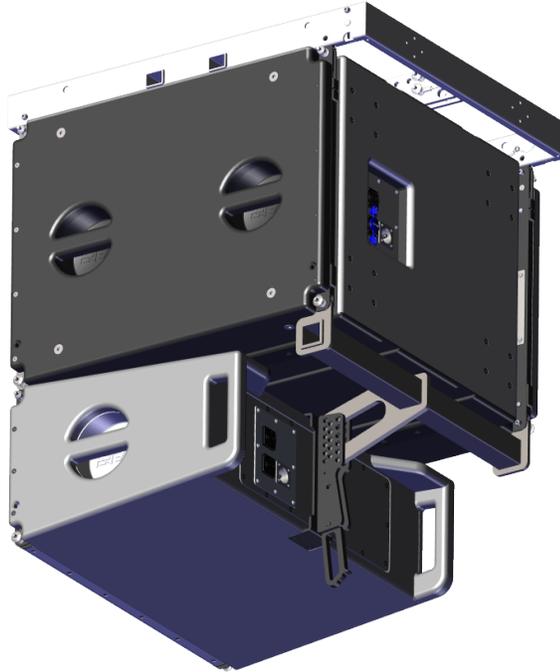
KF210 & SBX818 Carts

• The KF210 Cart can transport up to 4x KF210 line array items.
• SB818 Carts can transport up to 2x SB818 subwoofers
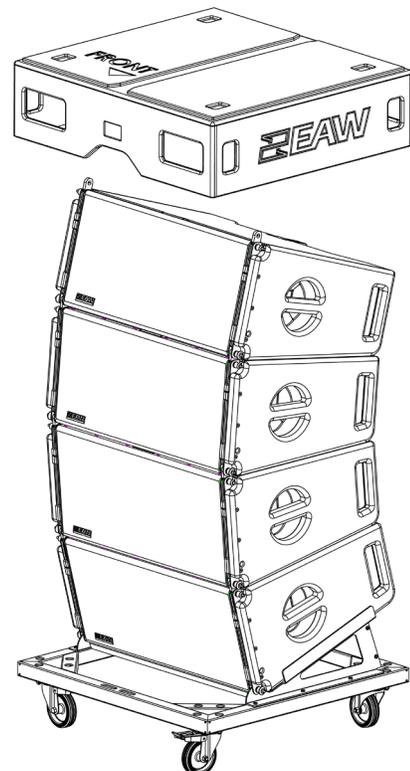
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