

## GAE EQX24 Optimizer



Der Optimizer EQX24 dient zur Ansteuerung der GAE Panorama-Systeme. Werksseitig wird jedes Gerät auf die jeweilige Systemkonfiguration eingestellt und erhält zur Kennzeichnung einen entsprechenden Anhang in der Typenbezeichnung. (z.B.: EQX24-1001/1500) Der Optimiser erzielt bei einfacher Bedienung eine beeindruckende Wirkungsweise. Wenige Funktionsschalter und eine optimal angepaßte Klangregelung erschließen bei unkomplizierter Handhabung eine Vielzahl von Anwendungsmöglichkeiten. In allen Systemen der GAE Panorama-Serie werden die Hochtöner durch eine im passiven Filter integrierte elektrische Überlastungsschaltung geschützt. So konnte auf aufwendige Signallimiter verzichtet werden. Moderne leistungsangepaßte Endstufen mit Clip-Schutz bilden eine perfekte Verbindung mit dem Optimizer EQX24.

*The Optimizer EQX24 assists the driving of all GAE Panorama systems. The adjustments for a specific system combination are factory set and the corresponding addition to the model name is made (e.g. EQX24 1001/1500). The EQX24 is simple to use and achieves impressive results without being complicated in operation. Only a small number of function-buttons and an optimally matched tone control allow numerous application possibilities whilst being uncomplicated in handling. All GAE Panorama system HF-components are electronically protected with an overload protection integrated into the passive crossover. As such the integration of expensive signal limiters in the EQX could be avoided. Modern, matched, power amplification with integrated clip-protection provides a perfect combination with the Optimizer EQX24.*

<b>Dimensions (W x H x D)</b> .....	19" / 1HE, 100mm (3.94")
<b>Weight</b> .....	1.7kg
<b>Power supply</b> .....	230-240V, 115-120V / 50-60Hz, <7VA non-leakage toroidal transformer, transient-protection, primary circuit: safety fuse, M 0.25A secondary circuit: maintenance-free PTC-resistor
<b>Inputs</b> .....	electronically balanced, input impedance 20kΩ
<b>Maximum input level</b> .....	+20dBu (BASS GAIN ≤ REF) +16dBu (BASS GAIN max. @ 50Hz)
<b>Outputs</b> .....	electronically balanced, output impedance ≤ 20Ω
<b>Maximum output level</b> .....	+20dBu in 600Ω (=10Vrms)
<b>THD+N</b> .....	≤ 0.008%
<b>Signal/Noise ratio FR/Hi</b> .....	≥ 93dBV (linear-weighted 22Hz...22kHz) ≥ 97dBV (A-weighted)
<b>Signal/Noise ratio BASS</b> .....	≥ 98dBV (linear-weighted 22Hz...22kHz) ≥ 102dBV (A-weighted)
<b>Dynamic range FR/Hi (150...22kHz)</b> .....	≥ 111dB (linear-weighted) ≥ 116dB (A-weighted)
<b>Dynamic range BASS (22...150Hz)</b> .....	≥ 116dB (linear-weighted) ≥ 120dB (A-weighted)
<b>Channel cross-talk FR/Hi</b> .....	≥ 90dB @ 1kHz ≥ 73dB @ 20kHz
0dBV ≡ 1V	
0dBu ≡ 0.775V ≡ -2.214dBV	

# OPERATION MANUAL

## GAE Optimizer EQX24

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## Important

Be sure to read the following before connecting and operating this device for the first time:

- This unit contains no user-serviceable parts.
- There are no operating controls inside the unit. It is not necessary to open the unit for operation.
- Refer all repair and maintenance to authorised GAE service personnel.
- Tampering with the internal circuitry will void any guarantee claims.
- Be sure to allow for sufficient cooling during operation especially when rack mounting this unit above other heat producing units (amplifiers etc.).
- The main fuse of this device is a maintenance-free PTC-resistor in the secondary circuit. The primary circuit fuse provides an extra protection against a defect in this circuit. This fuse may only be replaced with the specified type M0.25A (M= medium slow break) for 230V units. (M0.5A for 15 - 120V USA-units)
- Ensure that the unit is protected from heat and humidity.
- Make sure that the power source voltage specified on the rear panel of the unit matches your local AC mains supply. (220-240V/50-60Hz European-units, 115-120V/50-60Hz USA-units)
- Only use good quality cable material when connecting this unit. This applies to both signal and sense cables.
- Be aware that high voltages can occur in the sense cables.
- Read the operating manual carefully.

### Reference to EC statement of conformity

This document confirms that the product **GAE Optimizer EQX24** bearing the CE label meets all requirements in the EMC directive 89/336/EEC laid down by the Member States Council for adjustment of legal requirements, further more the product complies to the rules and regulations referring to the electromagnetic compatibility of devices from 30. August 1995.

This product bearing the CE label complies with the following harmonised or national standards:

**DIN EN 55011; DIN EN 55013; DIN EN 50014; DIN EN 55022; DIN EN 60555; DIN EN 50081-1/2**

The authorised declaration and compatibility certification lies with the manufacturer and can be viewed on request. Responsible as manufacturer is the company:

**opal audio vertrieb GmbH, Engerstraße 47, D-33824 Werther, ++ 49 5203-236/237 Fax 238**

*The awarding of the CE label confirms the compliance with legal directives issued for the manufacture and marketing of electronic and electrical devices. As such the CE label is not a „seal of quality“ but rather proof that the device bearing the label is conform with the electromagnetic compatibility standards laid down in the above named testing regulations.*

## WARNING

High volume levels can lead to irreversible hearing damage.

In cases where hearing becomes painful it is possible that damage is incurred within the whole nervous system.

Modern sound systems are designed to reproduce high volume levels and as such can be considered a danger to human hearing when incorrectly operated.

## Short description of operating controls

### 1. FULL RANGE

**On (button ❶ front, depressed):**

At the FR/Hi-output the high-pass filtered FULLRANGE (FR)-signal is presented. This signal is particularly extended towards the lower frequencies.

**Off (button ❶ front, not depressed):**

At the FR/Hi-output the high-pass filtered HIGH (HI)-signal, preventing extreme loudspeaker hub, is presented. This position can be applied to monitor and speech only applications or for active sub bass extension situations.

### 2. MONO BASS

**On (button ❷ front, depressed):**

Both BASS-outputs provide the same bass-signal in the form of a MONO-sum.

(Only when ACTIVE BASS ❹ ON.)

### 3. BASS GAIN

**Dial ❸ with 41 indent positions and double function:**

**1) FULL RANGE ON ❶, ACTIVE BASS OFF ❹:**

Stepless boosting of the extended low frequency range at the FR/Hi-outputs. *Due to increased loudspeaker hub, extreme boosting reduces the power capacity of the low-frequency driver.*

**2) ACTIVE BASS ON ❹:**

Volume control of the BASS-outputs of between  $-\infty$ ...+9dB. At the REF position both the BASS- and FR/Hi-outputs deliver equal electrical output. The complete control range allows the matching of differing efficiencies between connected sub-bass and full-range systems

### 4. ACTIVE BASS

**On (button ❹ front, depressed):**

Activates the BASS-outputs and routes the function of the BASS GAIN control to here.

**Off (button ❹ front, not depressed):**

The BASS-outputs are muted and the BASS GAIN control allows the stepless adjustment of the low frequency segment at the FR/Hi-outputs.

### 5. LOW MID EQ

**Dial ❺ with 41 indent positions, Flat...Max (0...+6dB):**

Allows the individual boosting of the low/mid frequencies especially effective when operating isolated single systems. *Extreme loudspeaker hub can cause damage to woofer loudspeakers especially in combination with the extended low frequencies of the FULL RANGE mode.*

### 6. LOW MID EQ

**On (button ❻ front, depressed):**

Activates dial ❺.

### 7. MID EQ

**Dial ❼ with 41 indent positions, Min...Flat (-9...0dB):**

Allows the stepless cutting of the mid-range band for adjustment to individual hearing preferences and for the adaptation to given room acoustics.

### 8. MID EQ

**On (button ❼ front, depressed):**

Activates dial ❼.

### 9. POWER

LED shows the power status of the device.

## General function description

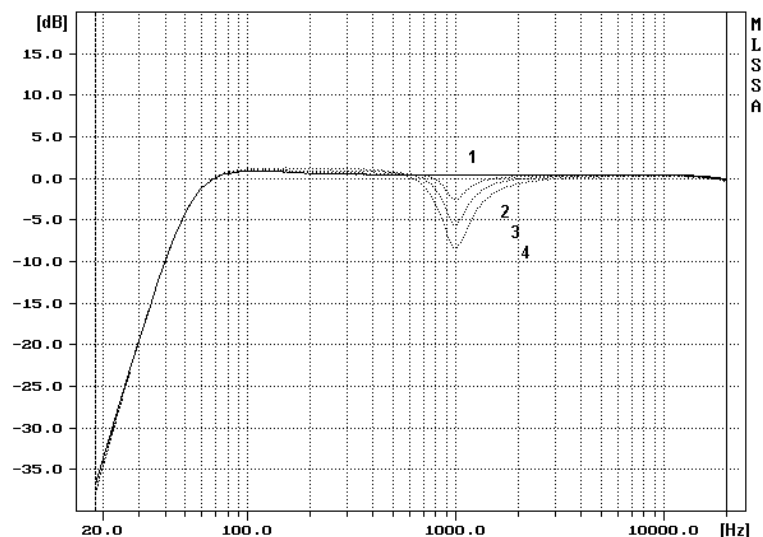
The Optimizer EQX24 assists the driving of all GAE Panorama systems. The adjustments for a specific system combination are factory set and the corresponding addition to the model name is made (e.g. EQX24 1001/1500). The EQX24 is simple to use and achieves impressive results without being complicated in operation. Only a small number of function-buttons and an optimally matched tone control allow numerous application possibilities whilst being uncomplicated in handling. All GAE Panorama system HF-components are electronically protected with an overload protection integrated into the passive crossover. As such the integration of expensive signal limiters in the EQX could be avoided. Modern, matched, power amplification with integrated clip-protection provides a perfect combination with the Optimizer EQX24.

The following is an explanation of the device's function using exemplary frequency range graphs. The corner frequencies of the shown response curves vary according to the factory-set system configuration.

- Due to design conditions, bass reflex systems, as used in the GAE Panorama-Series, should generally be driven with a high-pass filtered audio signal. In this way it is guaranteed that the loudspeaker is not unnecessarily loaded with low frequency signals below the tuning frequency of the system which could lead to unnecessary wear. One of the basic functions of the EQX24 is a subsonic-filter, which works in favour of a reduction of membrane excursion in the low/mid speaker in the Top-box effectively limiting booming, popping and other unwanted low-frequency noise and maximising the power capacity of the overall system.

**Basic function with non-depressed button ①, ④: The high-pass filtered HIGH-signal is provided at the FR/HI-outputs, the BASS-outputs are muted.**

- Front-button ③ ON, dial ⑦ MID EQ: The coloration of audio signals around 1000Hz is a problem often confronted in day-to-day sound-reproduction situations. A small-band dip in this frequency area allows an audibly-advantageous influencing of the listening experience, especially when reproducing the human voice and the majority of pre-recorded material. With only marginal changes to the tonality of the system this dip induces a feeling of a more natural and relaxed reproduction. Additionally this situation is beneficial to microphone feedback-suppression in this frequency range. **Depressing the button ③ ON activates the dial ⑦ MID EQ with 41 indent positions in the operating range Min...Flat -9...0dB.**



Plot 1: Frequency range of the EQX24 at the FR/HI-outputs, Basic function high-pass filter.

Plots 2-4: MID EQ activated with switch ON.

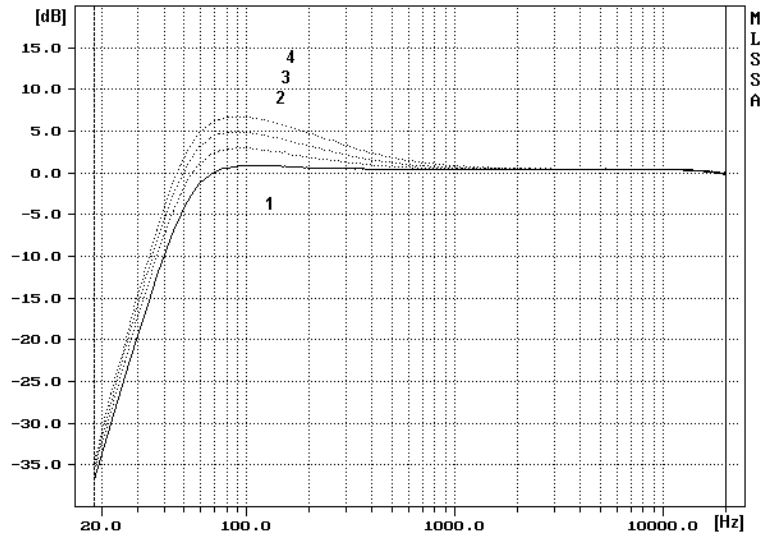
Plot 2: Dial-Position 2 o'clock,

Plot 3: Dial-Position 11:30,

Plot 4: Dial-Position MIN.

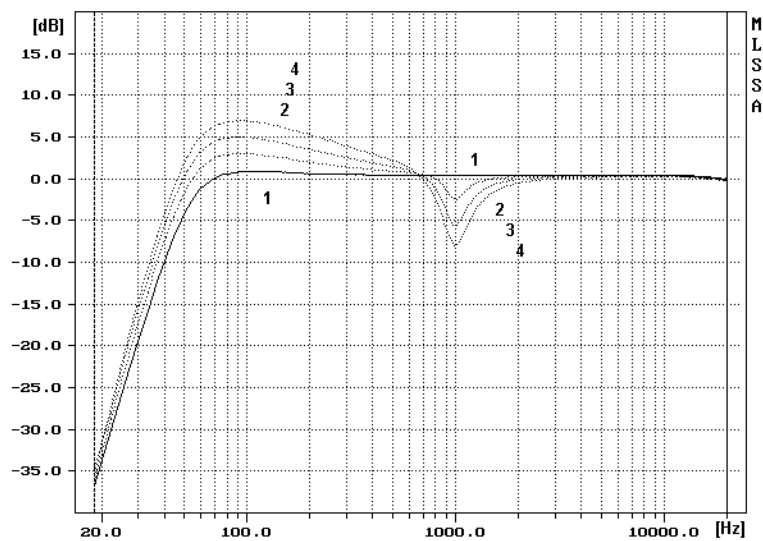
- Front button **ⓐ ON**, dial **Ⓢ LOW MID EQ**: Boosting the tuning frequency is often required to achieve tonal balance when loudspeaker systems are installed in free-space positions (e.g. when positioned on stands or flown). Cone-driver beaming effects and the consequent change to directivity necessitate an adjustment of the frequency range.

Depressing button **ⓐ ON** activates the dial **Ⓢ LOW MID EQ** with 41 indent positions in the operating range Flat...Max 0...+6dB.



Plot 1: Frequency range of the EQX24 at the FR/HI-outputs, Basic function high-pass filter.  
 Plots 2-4: LOW MID EQ activated with switch ON.  
 Plot 2: Dial-Position 11:30,  
 Plot 3: Dial-Position 2 o'clock,  
 Plot 4: Dial-Position MAX.

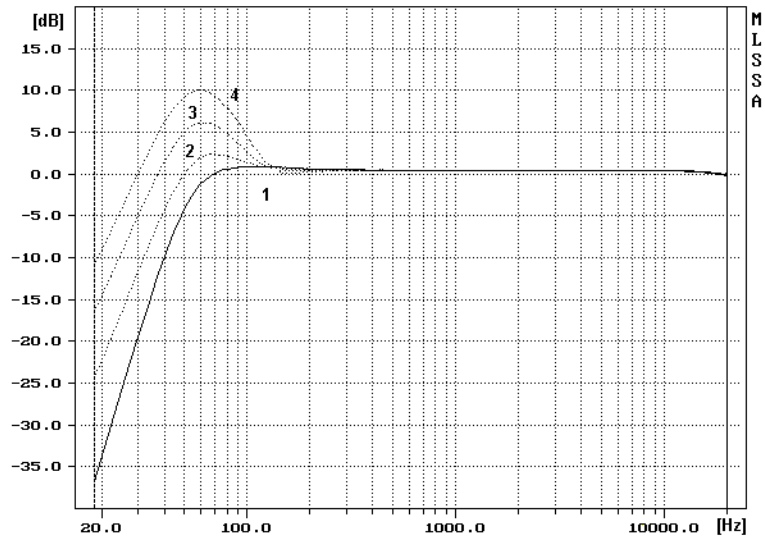
- A combination of **MID EQ** and **LOW MID EQ** allow for a multitude of practical, sound-influencing control possibilities which are easily achieved with only moderate effort and at the same time, disqualifying the necessity for expensive equaliser systems.



Combinations of MID EQ and LOW MID EQ.

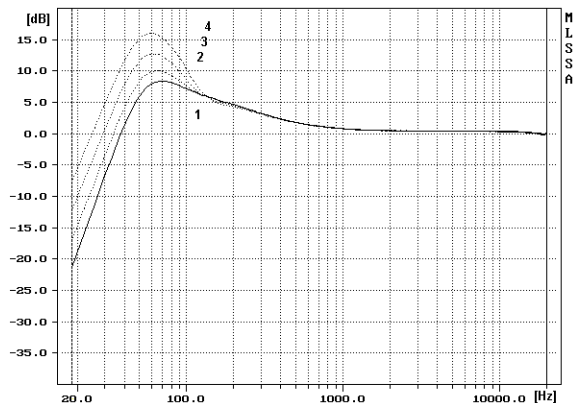
- Front button **1 FULL RANGE** depressed (**4 ACTIVE BASS** not depressed): Dial **3 BASS GAIN**: The function FULL RANGE increases the low frequency segment at the FR/HI-outputs and can be steplessly increased to enable a small-band bass boost solely in the low-frequency range. A powerful bass foundation with a warm sounding reproduction, even with smaller systems, can be obtained with experienced operation at low and middle volumes. Because the bass-boost allows increased amplification values for reduced volumes a reduction of this level is necessary when operation at higher volumes.

Front button **1 FULL RANGE** depressed (and **4 ACTIVE BASS** not depressed) activates the dial **3 BASS GAIN** with 41 indent positions in the operating range 0...+9dB.

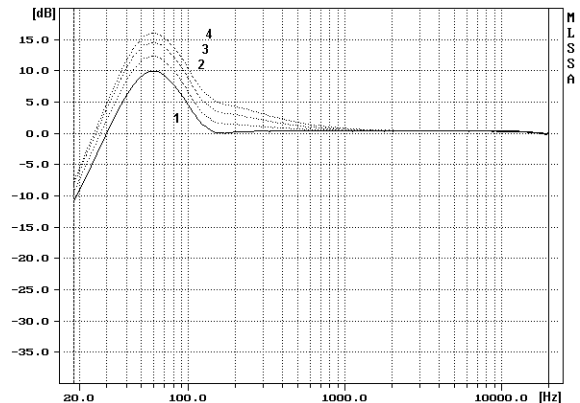


Plot 1: Frequency range of the EQX24 at the FR/HI-outputs, Basic function high-pass filter (FULL RANGE not activated.)  
 Plot 2-4: Dial BASS GAIN activated with switch FULL RANGE.  
 Plot 2: Dial-Position MIN (Left to stop),  
 Plot 3: Dial-Position 2 o'clock,  
 Plot 4: Dial-Position MAX (Right to stop).

- A combination of the functions **FULL RANGE** and **LOW MID EQ** allow a wide range of control possibilities leading to a noticeable increase in tonality, only otherwise achieved with the experienced use of equalisers:



LOW MID EQ max.,  
 FULL RANGE/GAIN varied.  
 CAUTION! Plot 4: Extreme Loudness-Effect  
 with very high amplification values.

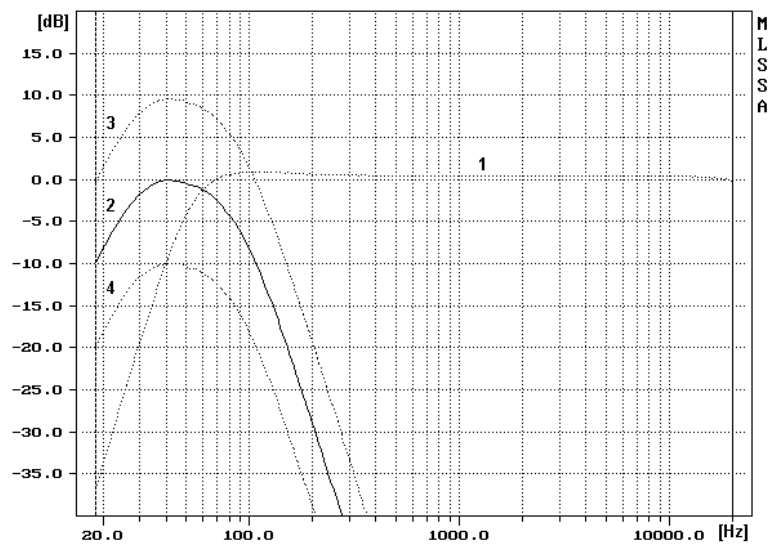


FULL RANGE/GAIN max.,  
 LOW MID EQ varied.  
 CAUTION! Plot 4: Extreme Loudness-Effect  
 with very high amplification values.

- Front button **④ ACTIVE BASS** depressed: Dial **⑤ BASS GAIN**: The control function of BASS GAIN is switched to the separate BASS-output with the function ACTIVE BASS. The dial now as the function of a volume control for the active-driven power amplifier. The crossover frequency of the bass signal is determined in the individual EQX24 system configuration. At the position REF both the BASS- and FR/HI-outputs deliver equal electrical output. The audio signal at the FR/HI-outputs remains unchanged regardless of the position of the BASS GAIN dial. The functions MID EQ and LOW MID EQ, when activated remain operative at the FR/HI-outputs. The over-lapping of the FR/HI and BASS audio signals in the crossover region occurs "phase-corrected" and supports the coupling to "satellite" systems. Bass systems, driven on the activated BASS-output should not incorporate a passive filter network.

*Note: In this mode of operation the FULL RANGE function can also be activated for the FR/HI-outputs, however, due to the higher power capacity in the low frequency range, this method should only be executed when operating at moderate volume levels using mid/high systems installed at greater distances from the bass systems. In this mode the high-pass filter is moved to a lower frequency (page 6, Plot 2, top diagram) and effects a distinctly greater loudspeaker hub in the full range system. The use of this mode is not advisable for high power applications.*

**Front button ④ ACTIVE BASS depressed activates the BASS-outputs together with the dial ⑤ BASS GAIN with 41 indent positions in the operating range  $-\infty\dots+9\text{dB}$ .**



- Plot 1: Frequency range of the EQX24 at the FR/HI-outputs, Basic function high-pass filter. (FULL RANGE not activated.)
- Plots 2-4: Frequency range of the EQX24 at the BASS-outputs, Dial BASS GAIN activated with switch ACTIVE BASS, separate BASS-outputs activated.
- Plot 2: Dial-Position REF,  
 Plot 3: Dial-Position MAX (Right to stop),  
 Plot 4: Dial-Position 10:30.

- Front buttons **② MONO BASS** and **④ ACTIVE BASS** depressed: The bass signal is presented as a mono-sum signal to the BASS-outputs.

**Front buttons ② MONO BASS and ④ ACTIVE BASS depressed activates the BASS-outputs together with the dial ⑤ BASS GAIN with 41 indent positions in the operating range  $-\infty\dots+9\text{dB}$ , the bas signal is presented as mono-sum.**



- The **POWER-LED** is situated on the front panel and indicates the operational status of the unit. Should the LED fail to light when connected to the mains it is necessary to check the fuse, which can be found on the inside of the device. Here it is necessary to open the device.  
**Important! Always disconnect the unit from the power supply before opening the enclosure!** Only replacement fuses of the same type should be used. Should the LED still fail to light after replacing the fuse then there is a failure to the device and the maintenance-free PTC-resistor is protecting from further damage.

**All repair and service work should be carried out by authorised personnel only.**

## **CONNECTIONS**

- **INPUT:** One balanced XLR-input for each channel can be found on the rear panel of the GAE EQX24. High quality input amplifiers ensure a minimum of distortion and a maximum of signal to noise ratio.
- **OUTPUT:** Four outputs for the connection of the EQX24 with the power amplifiers can be found on the rear panel of this device. The outputs are electronically balanced and are of low impedance. At least 6...10 power amplifiers (depending on input impedance) can be connected to each channel and frequency area without problem.

**Please refer to "Hints on connection"! Polarity reversal, incorrect signal direction and faulty cable material can cause serious damage to all connected equipment and loudspeakers!**

## Technical Specifications

Dimensions (W x H x D) .....	19" / 1U, 100mm (3.94")
Weight .....	1.7kg
Power supply .....	230-240V, 115-120V / 50-60Hz, <7VA non-leakage toroidal transformer, transient-protection, primary circuit: safety fuse, M 0.25A secondary circuit: maintenance-free PTC-resistor
Inputs .....	electronically balanced, input impedance 20k $\Omega$
Maximum input level .....	+20dBu (BASS GAIN $\leq$ REF) +16dBu (BASS GAIN max. @ 50Hz)
Outputs .....	electronically balanced, output impedance $\leq$ 20 $\Omega$
Maximum output level .....	+20dBu in 600 $\Omega$ ( $\cong$ 10Vrms)
THD+N .....	$\leq$ 0.008%
Signal/Noise ratio FR/Hi .....	$\geq$ 93dBV (linear-weighted 22Hz...22kHz) $\geq$ 97dBV (A-weighted)
Signal/Noise ratio BASS .....	$\geq$ 98dBV (linear-weighted 22Hz...22kHz) $\geq$ 102dBV (A-weighted)
Dynamic range FR/Hi (150...22kHz) .....	$\geq$ 111dB (linear-weighted) $\geq$ 116dB (A-weighted)
Dynamic range BASS (22...150Hz) .....	$\geq$ 116dB (linear-weighted) $\geq$ 120dB (A-weighted)
Channel cross-talk FR/Hi .....	$\geq$ 90dB @ 1kHz $\geq$ 73dB @ 20kHz

0dBV  $\cong$  1V

0dBu  $\cong$  0.775V  $\cong$  -2.214dBV

# ANHANG A (Bedienungselemente)

Abbildung (A): Frontseite

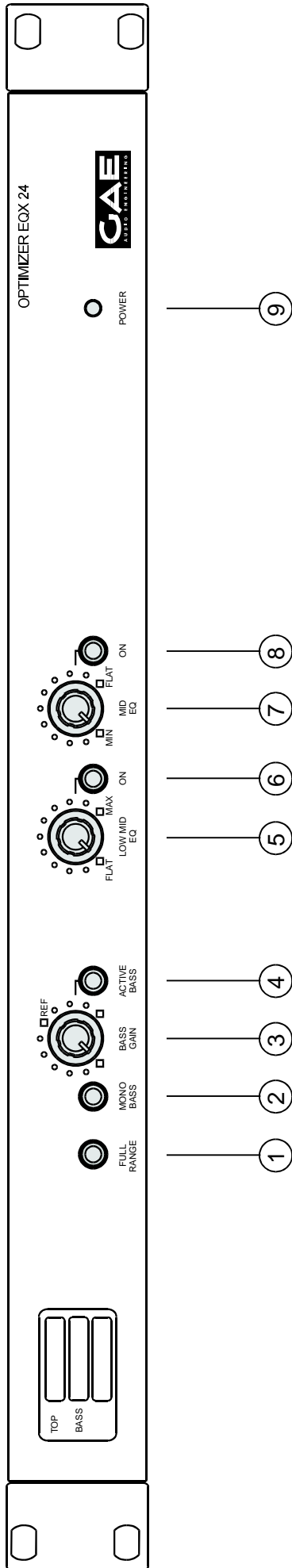
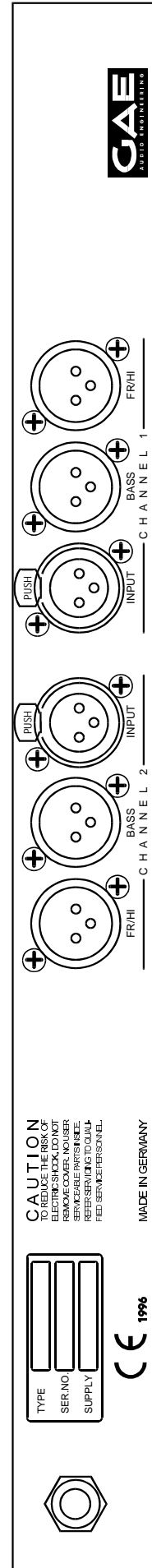
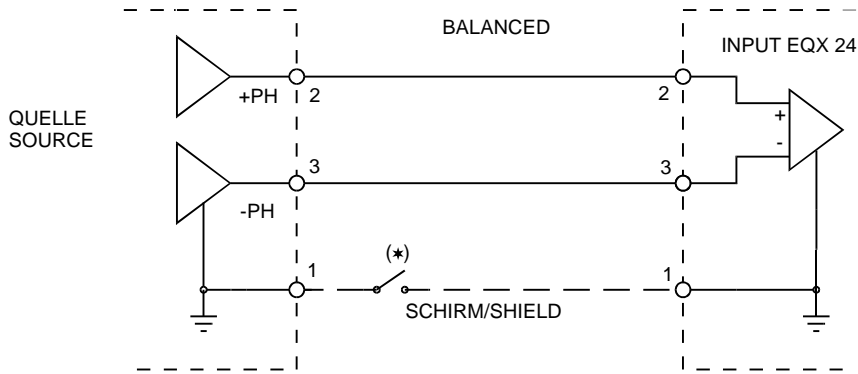


Abbildung (B): Rückseite

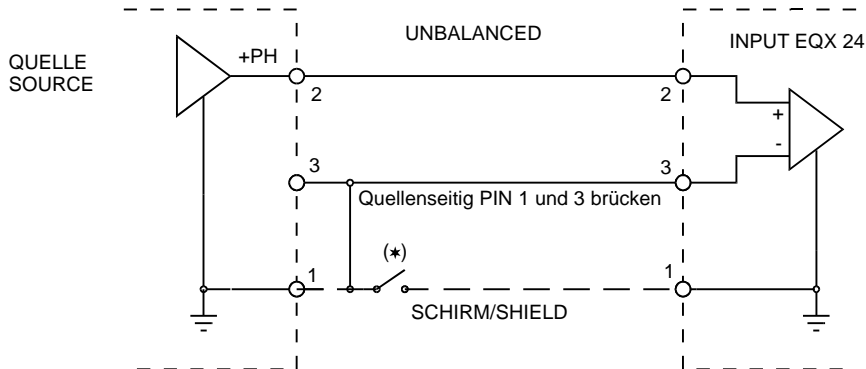


# ANHANG B (Anschlußhinweise GAE Optimizer EQX 24)

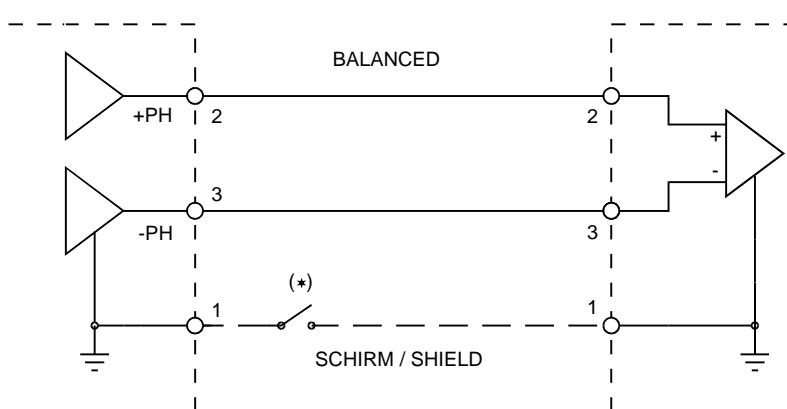
1) BALANCED IN / Impedance = 20 kOhm



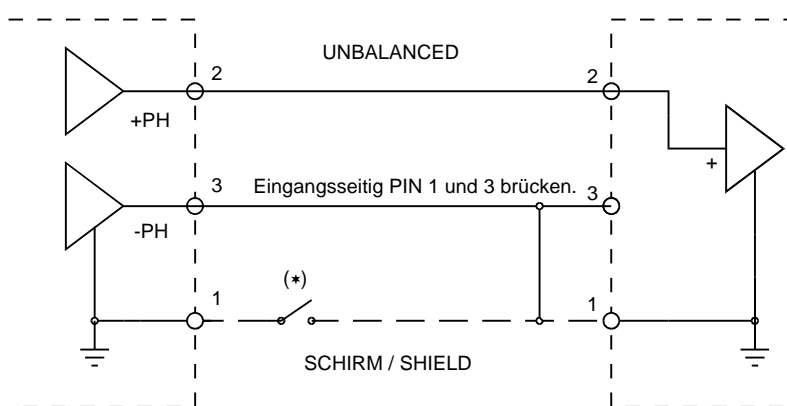
2) UNBALANCED IN



3) BALANCED OUT / IMPEDANCE < 20 Ohm  
EQX 24 OUTPUT



4) UNBALANCED OUT  
EQX 24 OUTPUT

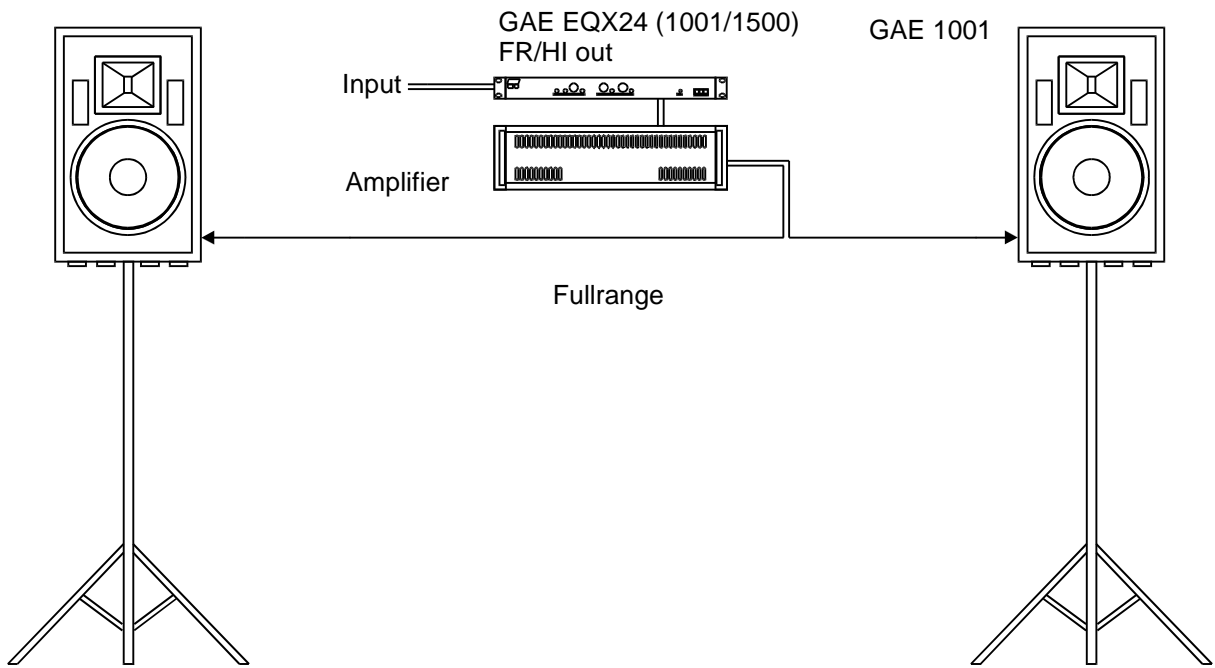


(\*) Zur Behebung der Wirkung von Brummschleifen (Ground Loops) eventuell notwendig.

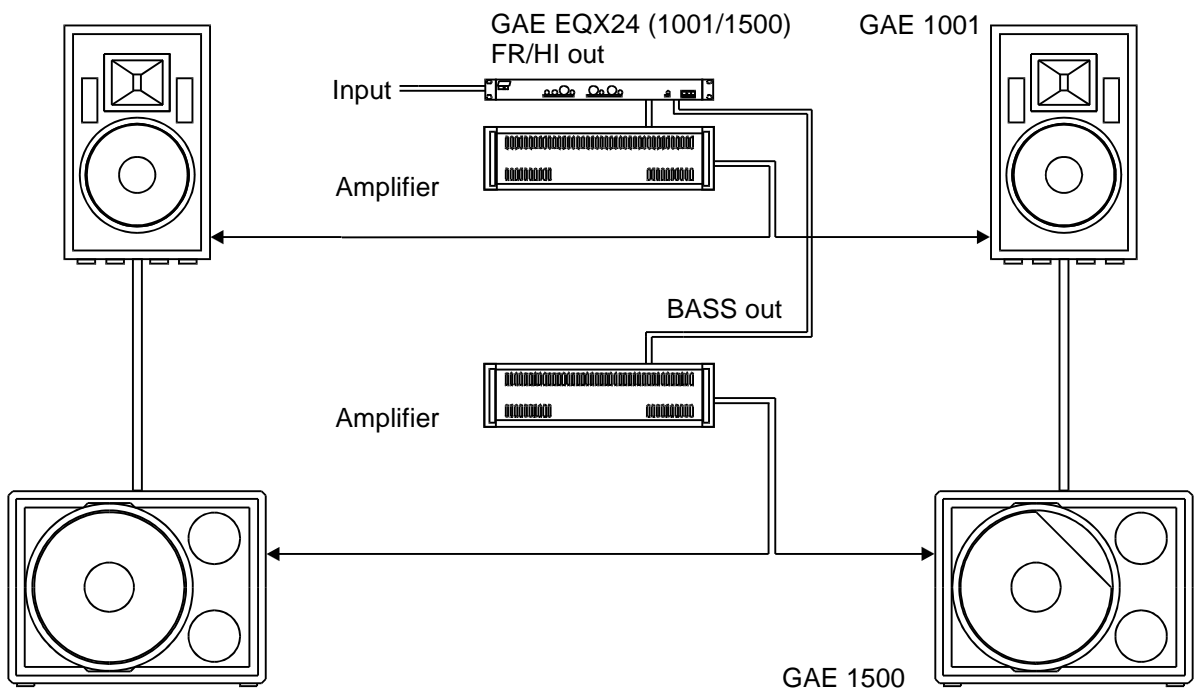
Der aktive Ausgang des EQX 24 ist anschlußseitig wie ein Transformatorausgang anzusehen.

Nur zweiadrige, abgeschirmte Signalleitungen verwenden!

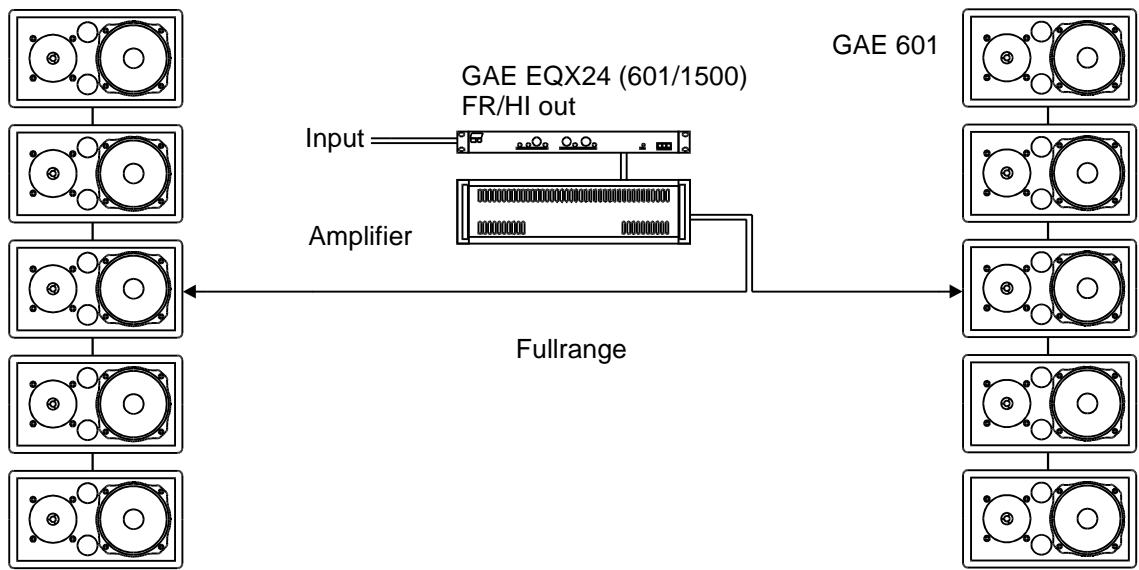
## ANHANG C (Anwendungsbeispiele)



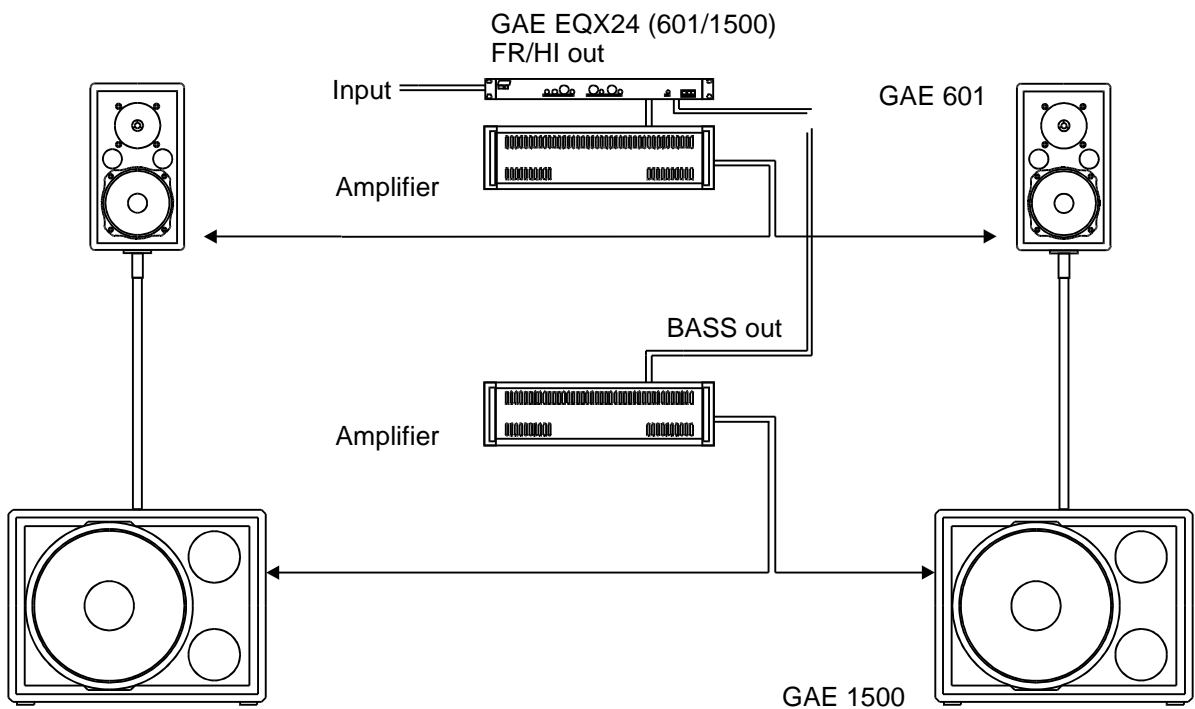
Fullrange-Betrieb der GAE Panorama 1001.



2-Weg-aktiv-Betrieb der Systemkombination GAE Panorama 1001/1500.



Fullrange-Betrieb der GAE Panorama 601. Bei zurückhaltenden Leistungsanforderungen im Tieftonbereich kann dieser Lautsprecher im Vollbereichsmodus betrieben werden.



2-Weg-aktiv-Betrieb der Systemkombination GAE Panorama 601/1500.