NEUMANN.BERLIN

KH 120 ANSWERS

Has the philosophy of this new Neumann monitor changed compared to the K+H monitors?
No. We aim to provide tools for measuring sound (studio monitors) with the following performance features:

- A flat frequency response
- Low distortion and noise
- Deep LF extension
- Robust mechanics and extensive protection system for a long lifetime
- Extensive features
- Adaptability to the acoustical environment
- Flexible interconnectivity
- Good visual design
- Good value for money: performance vs. cost

Why develop the KH 120?
After 10 successful years of the O 110, techniques have improved in all areas of product design:

- Flatter on-axis response
- Smoother off-axis response (dispersion)
- Decreased low frequency extension
- Lower harmonic and intermodulation distortions
- Higher maximum SPL
- Better electronics features
- Supports a wide range of source levels
- Switched mode power supply
- Updated digital input
- New manufacturing techniques
- New Neumann branding
- Lower pricing

The result is a step change in overall product performance.

What are the differences between the KH 120 and the O110?

Whilst the O 110 is a very good loudspeaker, the KH 120 has the following performance improvements:

- Deeper LF: 52 vs. 56 Hz.
- Slightly flatter frequency response
- 3.4 dB higher maximum SPL: 111.1 vs.107.7 dB SPL at 1m (100 – 6000 Hz)
- Lower distortion (harmonic and intermodulation)
- Ergonomic acoustical control plus a new treble control
- Wider range of input/output level adjustment: 35 dB vs. 24 dB.
- Externally adjustable ground lift switch
- Dimmable bicolor front panel logo
- Higher maximum sample rate on the digital input: 192 kHz vs. 96 kHz
- Buffered BNC output for robust interconnectivity
- Digital delay for time-of-flight and lip-sync adjustment
- More consistent visual design to other models in the range
- Neumann branding for increased international recognition

The KH 120 is cheaper than the O 110. Is it better or worse?

We have spent three years reviewing all aspects of the design to optimize the product's overall performance whilst simultaneously reducing the parts and manufacturing costs. The result is a better product at a lower cost.

Why did you use a different enclosure material?

We have used aluminum for the cabinet material as it provides a good balance between these features:

- Ability to make the desired shapes: waveguide, corners, rear panel, internal fixings
- Good heatsink for amplifiers
- Good electromagnetic shielding
- Homogenous (even density) material
- Good acoustical behavior
- Unit cost of parts
- Good handling in manufacturing
- Robust
- Can be recycled

Why is the x-over frequency fix at 80 Hz

Adding a subwoofer to a loudspeaker has a couple of advantages which are:

- Lower cut off frequency (18 Hz, -3 dB)
- More freedom regarding placement
  The directivity of a loudspeaker is quite omnidirectional at low frequencies. This leads to reflections at the front wall which interferes with its direct signal. This interference leads to strong cancelations in the frequency response and should be avoided.
    - Since the lower cutoff frequency of the loudspeaker is increased to 80 Hz, the distance which should be avoided between front wall and loudspeaker is less wide.
      distance to be avoided in full range mode:
      KH 80 0,4 m … 1,5 m
      KH 120 0,4 m … 1,7 m
      KH 310 0,4 m … 2,3 m
      KH 420 0,4 m … 2,9 m
      distance to be avoided in bass managed mode
      KH 80 0,4 m … 1,0 m
      KH 120 0,4 m … 1,0 m
      KH 310 0,4 m … 1,0 m
      KH 420 0,4 m … 1,0 m
      The subwoofer should be placed directly at the front wall
- Higher max SPL
- Less harmonic distortion
- Less intermodulation distortion
- More flexibility with acoustical controls
- Possibility for lateral room mode suppression with subwoofer placement

The x-over frequency between the loudspeakers and the subwoofer has a significant influence on several acoustical parameters.

This is an overview of how a decrease of the x-over frequency influences these parameters

PARAMETER	SYSTEM PERFORMANCE
MAX SPL	drops
GROUP DELAY	increases
LOCALIZATION	decreases
THD	increases
INTERMODULATION DISTORTION	increases

We've carefully chosen a x-over frequency which leads to the best compromise between these advantages and disadvantages of higher and lower x-over frequencies.

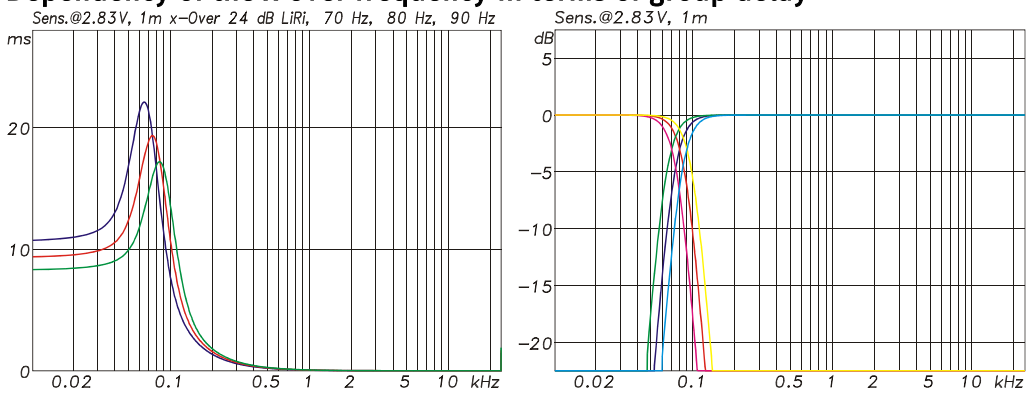
As long as the x-over frequency is below the natural cut off frequency of the loudspeaker this relationship is valid for all loudspeakers.

However, depending on the acoustical circumstances inside the room it might be useful to change the x-over frequency. This can for example be the case if the subwoofer stimulates a strong room mode at e.g. 80 Hz while the monitor doesn't. In this case it would help to reduce the x-over frequency.

By having a close look at just some of these relationships users are often inclined to weight these parameters high which then leads to an either increase or decrease of the x-over frequency.

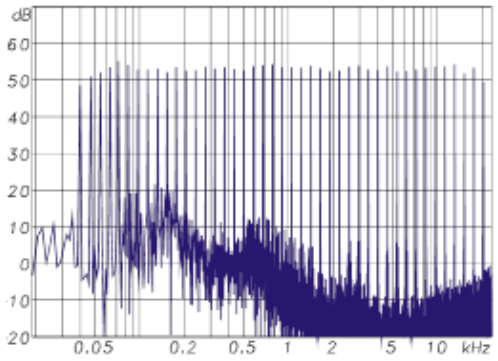
To achieve the best acoustical performance of the system in the by far most conditions we decided to define the x-over frequency at a fixed frequency of 80 Hz knowing that at some rare cases a different frequency may lead to slightly better results.

Dependency of the x-over frequency in terms of group delay

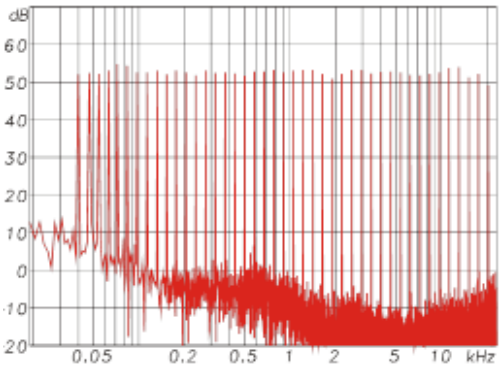


The lower the x-over frequency is the higher the group delay increase is. This leads to a less tight bass impulse.

Intermodulation distortion

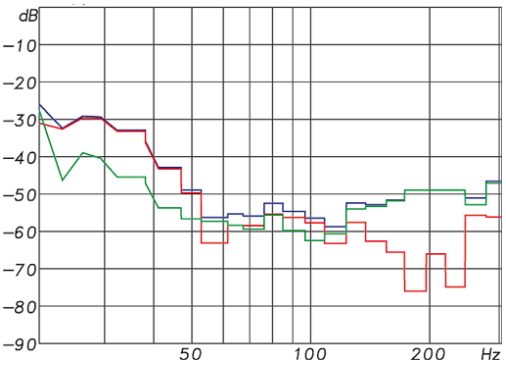


KH 310 fullrange

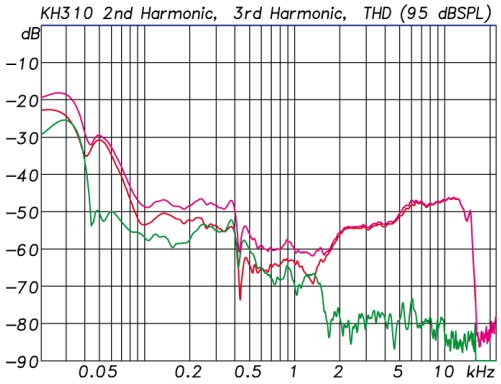


KH 310 + KH810

Total harmonic distortion (at 95 dB SPL in 1 m)



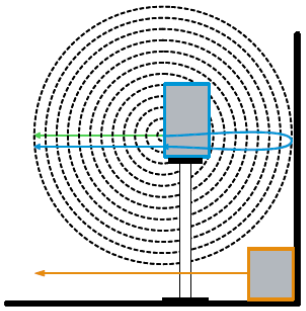
KH 810



KH 310

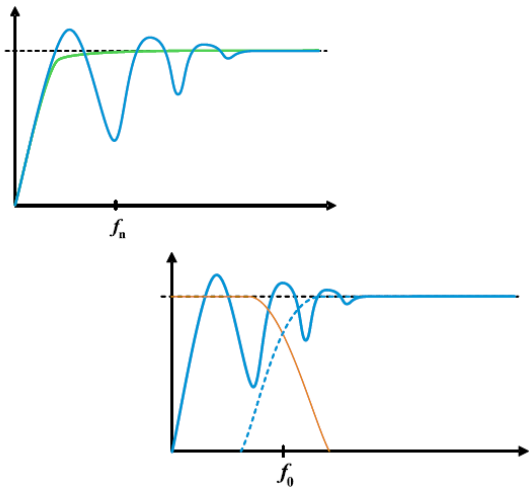
Loudspeaker-Boundary Location

- Low frequency energy from loudspeakers is omni-directional
- Direct sound combines with reflected sound
- Constructive and destructive interference (comb filtering) results
- First notch at ¼λ is the strongest
- Move the loudspeaker and/or add a subwoofer
- Also consider the listening position's distance to the back wall (¼λ)
- Also consider other ½λ cancellations from the side walls, floor and ceiling



Full Range Loudspeakers

Distance from Wall			First Notch
[m]	[ft]	[in]	[Hz]
0.20	0	8	430
0.40	1	4	215
0.60	2	0	143
0.80	2	7	108
1.00	3	3	86
1.20	3	11	72
1.40	4	7	61
1.60	5	3	54
1.80	5	11	48
2.00	6	7	43
2.20	7	3	39
2.40	7	10	36
2.60	8	6	33
2.80	9	2	31
3.00	9	10	29
3.20	10	6	27
3.40	11	2	25
3.60	11	10	24
3.80	12	6	23
4.00	13	1	22



Bass Managed Loudspeakers

Distance from Wall			First Notch
[m]	[ft]	[in]	[Hz]
0.20	0	8	430
0.40	1	4	215
0.60	2	0	143
0.80	2	7	108
1.00	3	3	86
1.20	3	11	72
1.40	4	7	61
1.60	5	3	54
1.80	5	11	48
2.00	6	7	43
2.20	7	3	39
2.40	7	10	36
2.60	8	6	33
2.80	9	2	31
3.00	9	10	29
3.20	10	6	27
3.40	11	2	25
3.60	11	10	24
3.80	12	6	23
4.00	13	1	22

Why has the woofer grille a shape of a woofer cone?

Flat grilles of this size tend to have a high frequency ringing sound, however, after many trials, we found that this cone shaped design minimizes the resonances. Additionally, the woofer grill shape brings a family look to the whole product range, both now and into the future. Finally, a shaped grille is mechanically more robust than a flat grille.

There is no heat sink, are the power amplifiers smaller or do you use digital amplifiers with higher efficiency?

The power amplifiers are the same in the KH 120 and the O 110. We use a class A/B design which has the best performance, particularly in the mid-to-high frequency region. The consequence of this is an amount of heat that needs to be dissipated. However the whole of the aluminum cabinet acts as a heatsink so there does not need to be a conventional looking discrete heatsink.

The KH 120 uses a wide range power supply. Isn´t that worse than a standard transformer power supply?

The switched mode power supply has the advantage of allowing the KH 120 to be taken anywhere in the world without having to use step-up or step-down transformers. Additionally this type of power supply is more robust to poor quality mains supplies (voltage fluctuations) as the input voltage is converted to a stable dc supply not stepped down based on a fixed transformer turns ratio. Also mains hum (50/100 Hz or 60/120 Hz) commonly seen in linear transformer designs is avoided. On the other hand, designing the supply is harder but we have managed to achieve a very good performance, plus the benefits just mentioned.

Why don´t you have a transformer-balanced input stage in the KH 120?

There is no transformer-balanced input version of the KH 120 due to a lack of customer demand and to the reduced the cost of managing many article numbers. Our electronic-balanced inputs are very robust to electrical noise, especially when use in combination with the ground lift switch.

I´d like to have a different color than RAL 7021? What can I do?

Currently we only offer Anthracite (RAL 7021) as a cabinet color. It is NOT recommended to try and paint the cabinet a different color as it would have to be completely disassembled first, painted, and then reassembled. The additional thickness of the newly applied paint can create difficulties in reassembly. Additionally the reassembled product would have to be retested to ensure correct performance according to the specifications. The tools for these measurements are very specialized, not commonly available and hard to set up correctly.

Can I use the KH 120 in combination with "O" monitors?

Yes and no. The sound character is very similar so the Neumann KH 120 A / KH 120 D can be used a drop in replacement for the K+H O 110 / O 100 D (with some exceptions). Here are some examples:

- Always use the same loudspeaker model in a stereo pair. Do not use one O 110 / O 100 D for the left and one KH 120 A / KH 120 D for the right as the imaging will not be optimal due to slight magnitude and phase differences between the models.
- If there is a pair of O 110 / O 100 D and the system needs to be extended to a multichannel 5.1 system, simply add three KH 120 A / KH 120 D monitors and a subwoofer if not already present. Then move the O 110s to rear channels.
- If there is a large broadcasting facility with many pairs of O 110 / O 100 D, simply start using KH 120 A / KH 120 D as a direct replacement. The sound character is very similar so
- If there is a pair of O 300 / O 300 D and the system needs to be extended to a multichannel 5.1 system, simply add another O 300 / O 300 D for the center and a

subwoofer if not already present. Then and add two KH 120 A / KH 120 D for the rear channels.

Can I use the same O 110 mounting hardware on the KH 120?

Some of the existing mounting hardware does not work with the KH 120 A / KH 120 D or is inappropriate and so will be discontinued:

- LH 7, LH 8, LH 27, LH 31, LH 38, KG 30

Some of the existing mounting hardware works with the KH 120:

- LH 28, LH 29, LH 32, LH 43, LH 45, LH 46, LH 47, LH 48

Some new mounting hardware items have been added to the range:

- LH 61, LH 64, LH 65

If a KH 120 A / KH 120 D is to be mounted where an O 110 is currently mounted, it is possible that some new mounting hardware is required. For example an LH 61 is required in place of the LH 31 or LH 38.

Is there a difference in the input sensitivity of an O 110 and a KH 120?

The input sensitivity of the O 110 / O 110 D and the KH 120 A / KH 120 D are not the same. There were sometimes complaints about our loudspeakers having too low a sensitivity when used with consumer equipment, so a wider range of settings on the level controls is being added to new products. This started with the O 410 midfield monitor, then the O 810 and O 870 subwoofers, next the KH 120 A / KH 120 D nearfield monitor, and now the KH 810 and KH 870 subwoofers. Future product releases will have a similar control set.

The default setting on a O 110 / O 110 D is 0 dB attenuation.

The default settings on a KH 120 A / KH 120 D are:

Input attenuator	0 dB
Output level	100 dB SPL at 1m for a 0 dBu input level

With these settings the output level of an O 110 / O 110 D is 4.5 dB lower than the KH 120 A / KH 120 D. To get the two loudspeakers playing at the same output level for the same input level (input sensitivity), simple use the input attenuator of the KH 120 A / KH 120 D: turn it down by 4.5 dB (conveniently, -5 dB is marked on the back panel label). This

setting means that the KH 120 A / KH 120 D will generate 100 - 4.5 = 95.5 dB SPL at 1 m for a 0 dBu input level.

Note that the O 300 / O 300 D has the same sensitivity as an O 110 / O 110 D, so the same -4.5 dB input level attenuation will be required on a KH 120 A / KH 120 D if they are to be used together.