NEUMANN.BERLIN

KH 310 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 310 and what are the differences between the KH 310 and the O 300?
After 12 successful years of the excellent O 300 and 45 since the OY was first launched, techniques have continued to improve in all areas of product design and so we are able to offer the following performance and feature improvements:

Acoustics:
- Flatter on-axis response
- Smoother off-axis response (dispersion)
- Lower harmonic and intermodulation distortions
- 7.4 dB higher maximum SPL: 114.2 vs. 106.8 dB SPL at 1m (100 – 6000 Hz)
- New drivers with lower distortion
- LF response below 100 Hz improved
- Ribs on bass driver reduce radial standing waves across the surround material

Electronics:
- All new electronics with lower distortion and noise.
- Ergonomic acoustical controls
- Wider range of input/output level adjustment: 35 dB vs. 18 dB
- Higher maximum input level: +24 dBu
- Ground lift moved from mains connector to XLR input
- Higher maximum sample rate on the digital input: 192 kHz vs. 96 kHz
- Buffered BNC output for robust interconnectivity
- Digital input version has a built-in adjustable 400 msec delay for time-of-flight and lip-sync adjustment

- Delay is adjustable on the rear panel or using AES3 user-bits
- Switched mode power supply (SMPS) for use all around the world
- No multipin input

Mechanics:

- Neumann branding for increased international recognition
- New cabinet design to reduce structural resonances
- Recessed midrange driver to reduce accidental damage
- Dimmable bi-color front panel Neumann logo
- Latest manufacturing techniques
- Lab approvals for CE, UL/CSA, FCC, and CCC

The result is a step change in overall product performance.

The KH 310 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 310 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. The SMPS is also designed to be able to deliver a more stable voltage supply, for example a very high current delivery is required for high level impulsive sound such as kick drums and so with a stiffer power supply from an SMPS the result is a more solid bass impulse reproduction. 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 310?

There is no transformer-balanced input version of the KH 310 because our electronic-balanced inputs are very robust to electrical noise, especially when use in combination with the ground lift switch. Also the common-mode rejection ratio of the KH 310 electronic-balanced input stage is very high so induced signals on the cable are reduced at the input and not amplified by the subsequent KH 310 electronics. Finally, there is little demand from customers these days.

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.

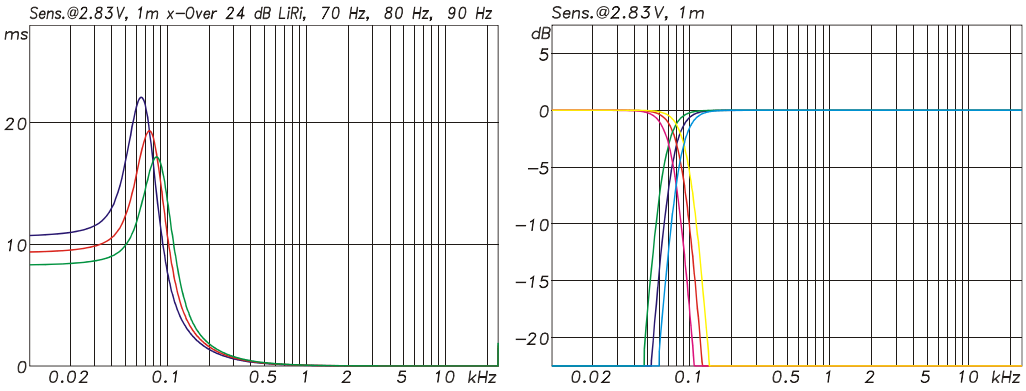
As long as the x-over frequency is below the natural cut off frequency of the loudspeaker this relationship is valid for all loudspeakers.

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.

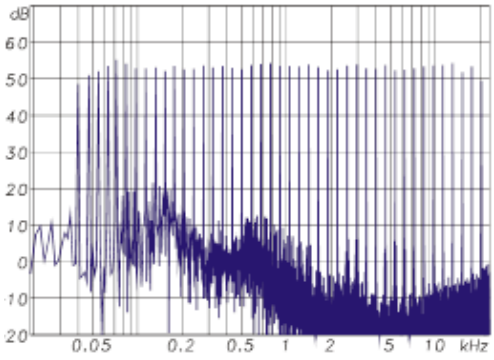
To achieve the best acoustical performance of the system in the by far most conditions we decided to define the x-over frequency at a fixed frequency of 80 Hz knowing that at some rare cases a different frequency may lead to slightly better results.

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

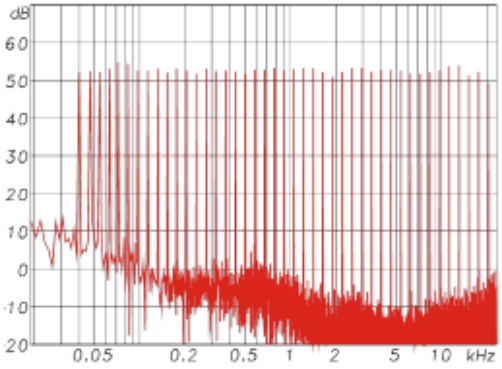


The lower the x-over frequency is the higher the group delay increase is. This leads to a less tight bass impulse.

Intermodulation distortion

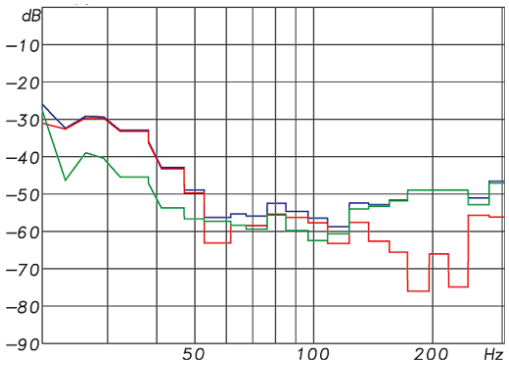


KH 310 fullrange

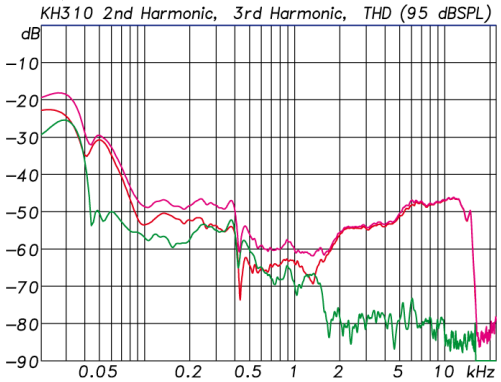


KH 310 + KH810

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

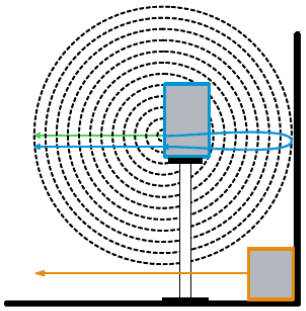


KH 810



KH 310

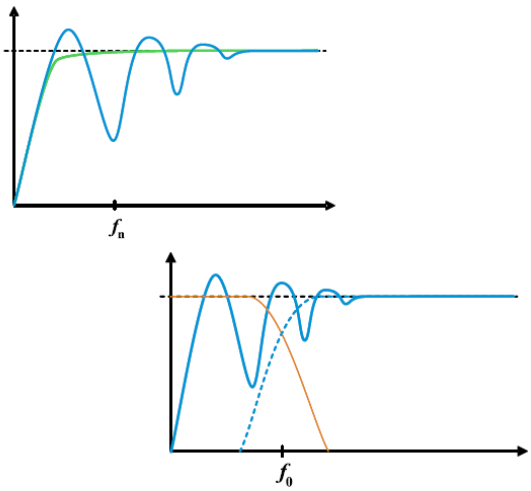
Loudspeaker-Boundary Location



- 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

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 310 in combination with "O" monitors?

Yes and no. The sound character is very similar so the Neumann KH 310 A / KH 310 D can be used a drop in replacement for the K+H O 300 / O 300 D electronic-balanced (with some exceptions).
Here are some examples:

- Always use the same loudspeaker model in a stereo pair. Do not use one predecessor product (e.g. O 300) for the left and one KH 310 A 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 300 / O 300 D and the system needs to be extended to a multichannel
  5.1 system, simply add three KH 310 A / KH 310 D monitors and a subwoofer if not already present. Then move the O 300s to the rear channels.
- If there is a large broadcasting facility with many pairs of O 300 / O 300 D, simply start using
  KH 310 A / KH 310 D as a direct replacement.
- If there is a pair of O 410 and the system needs to be extended to a multichannel 5.1 system, simply add another O 410 for the center and subwoofers if not already present. Then add two
  KH 310 A / KH 310 D for the rear channels.

Can I use the same O 300 / O 198 / O 98 mounting hardware on the KH 310?

Yes. We have ensured that all the existing mounting hardware for the O 300 works on the KH 310 so loudspeaker upgrade costs are minimized.

Is there a difference in the input sensitivity of an O 300 and a KH 310?

The input sensitivity of the O 300 / O 300 D and the KH 310 A / KH 310 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 all 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 an O 300 / O 300 D is 0 dB attenuation.

The default settings on a KH 310 A / KH 310 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 300 / O 300 D is 4.5 dB lower than the KH 310 A / KH 310 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 310 A / KH 310 D: turn it down by 4.5 dB (conveniently, –5 dB is marked on the back panel label). This setting means that the KH 310 A /
KH 310 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 310 A / KH 310 D if they are to be used together.