MANUAL

C-REFERENCE

Safety Instructions

1. Important, read all instructions – You should read all information concerning safety and operation before you use these speakers.

2. Please keep this manual – You may need it in the future.

3. Important, observe the warnings – All warnings on these speakers and in this manual should be observed by you in the interests of your own safety.

4. Please follow these instructions – All of the tips and instructions in this manual serve to optimize the operation of these speakers and enhance your listening experience.

5. Water and moisture–These speakers must not be used in wet environments, e.g. in bathrooms or next to a swimming pool, otherwise the danger of electric shock will exist.

6. Ventilation – This product must be installed in such a way,that the necessary ventilation is not impeded. For example, the equipment must not be operated on a bed, sofa, carpet or similar surface where the Black cooling fins can be covered. The equipment must not be placed in shelving or other locations that prevent a circulation of air at the rear of these speakers.

7. Heat- Please do not install these speakers near a radiator or other,similar source of heat.

8. These speakers are designed for use with an AC voltage of 115V / 60 Hz or AC230V- / 50 Hz, depending in which country you have purchased these speakers. Never attempt to operate these speakers with another power supply.

9. Power cable – Please lay your power cable in such a way that it is not a hazard for tripping over or can be damaged. In particular, be careful where cable connections and sockets are located.

10. Ensure that neither foreign objects nor liquids come into contact with or penetrate these speakers.

11. Properly qualified service personnel may only service these speakers.

12. Repairs – Never attempt to open these speakers or otherwise try and service or repair this equipment yourself unless this is described in this manual. Please leave this to properly qualified service personnel.

13. In order to avoid electric shock, never use this equipment with a power extension cable where the electrical contacts are not completely protected.

14. Ground – Please ensure that the ground and other connections to the equipment are not impeded.

15. These speakers are designed to reproduce analog audio signals. If the equipment is not operated according to these instructions, the warranty will not be applicable and the user will be exposed to danger of electric shock.

Warning: To prevent electric shock, these speakers must not be exposed to rain or moisture.

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The Coax Family

Thank you for choosing a KSdigital monitor.

For more than 20 years, KSdigital has been creating top-class monitors and pursues only one goal: to reproduce sound in a lifelike and unadulterated way. KSD products can be found in the control rooms of the most famous opera houses, in recording studios of top producers, as well as in various broadcasters and mastering studios. The innovative A-Serie and C-Reference family of FIRTEC monitors have already earned a very good reputation with many producers in renowned studios and well-known artists. Designed according to specifications resulting from the ideal of sound neutrality, the A- and C-Reference Serie monitors represent incorruptible tools for daily work.

Consistent in the development of C-Reference - The concept:

KSdigital FIRTEC (TM) Filter Technology: The usual way of signal processing in a loudspeaker is to correct the magnitude frequency response. The KSdigital FIRTEC (TM) technology is based on the realization that the human ear hears neither in amount nor phase, but merely a time-continuous information. Fluctuations in air pressure, which occur in correct time on the two eardrums, form the complete information of the acoustic ambience. This includes volume and direction and room information.

Spatial listening and virtual concert hall

But it is precisely in these temporal contexts that the spatial information, the depth of the concert hall, the virtual stage, in short: the depth staggering, is located. It is clear that the pure differences in intensity between the left and right stereo signal suggest a depth gradation at best, but there is a lack of essential information, namely that of the time differences. Only the correct temporal information at the ear can convey the temporal conditions in the recording. In this respect, it becomes clear why every serious loudspeaker manufacturer strives to use the best drivers, which already provide optimal transmission characteristics due to their design, so that corrections can be moderately outdated. However, in every reusable system the signal has to be broken down into the individual frequency ranges - bass, medium and high-frequency, a filtering with all the disadvantages mentioned above. In addition, the filters are used to compensate for frequency response collapses and increases. This is exactly where our FIRTEC (TM) technology comes in, which consists of a combination of a FIR differential crossover and a system filter.

Abb. C88-Reference

The Coax Family

The FIR differential crossover separates the paths with an arbitrarily pre-set slope steepness. The impulse response of a system with such a crossover does not contain any phase distorted components and is therefore extremely clean and without overshoot. The geometric offset of the sound source of the individual loudspeaker drivers in the cabinet is also already balanced. The FIR system filter then contains information about the geometric dimensions of the housing, the physical parameters of the loudspeaker components used and, depending on the listener's wishes, even information about the listening position in the room.

Each KSD monitor with FIRTEC™ technology is individually measured, so that all manufacturing tolerances of the used drivers are recorded in the measurement. This system response is then the basis for the data set of the FIR fi lter. This represents the inverse acoustic behaviour to the real loudspeaker. If a signal is fi rst sent through the FIR filter and then through the speaker itself, it is ideally radiated back to its original state from the speaker cabinet.

This means that with FIRTEC™ technology, the amount and phase are no longer used to optimize the speaker's transmission characteristics, but that the monitor optimizes the reproduction of the exact impulse. The loudspeaker cabinet is thus equalized by digital technology in such a way that the temporal progression of the input signal is radiated as faithfully as possible. If the loudspeaker converts the incoming music signal correctly into acoustic sound waves over time, the frequency response is automatically ideally linear in magnitude and phase.

Abb. C8-Reference

Chassis

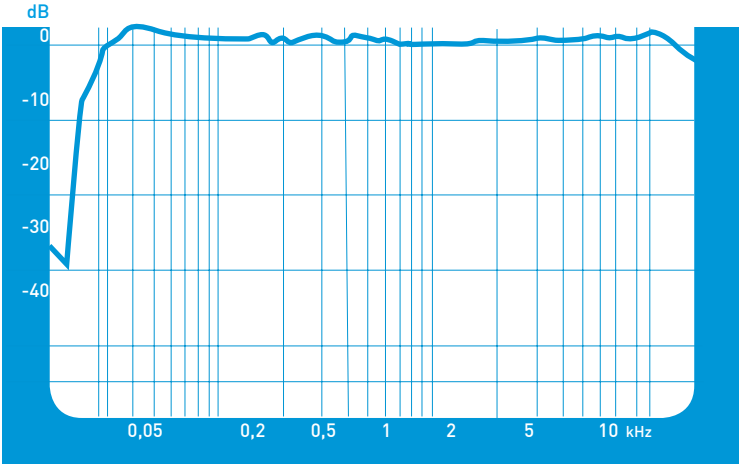
The chassis equipment:

The C-Refrence speakers differs considerably from most studio monitors. The main feature of the C-References is the 6"/1"coaxial driver in C5-Reference and the 8"/1" coaxial driver in C8- and C88-Reference.

Special designed membranes in the bass units (8" is real carbon) allows a linear and pure music reproduction. The highrange drivers for the range from approx. 1400 Hz offers sufficient reserves for low-distortion reproduction of all frequencies above the cut-off frequency. This was chosen very carefully „musically", as this crossover frequency allows a reasonable division into the fundamental and overtone ranges and the entire spectrum sounds cleanly reproduced and very balanced. This dramatically increases the sharpness and localization of the music signal in the stereo panorama. No artificial spatiality is simulated: flat images remain flat, and well staggered images are reproduced in this way.

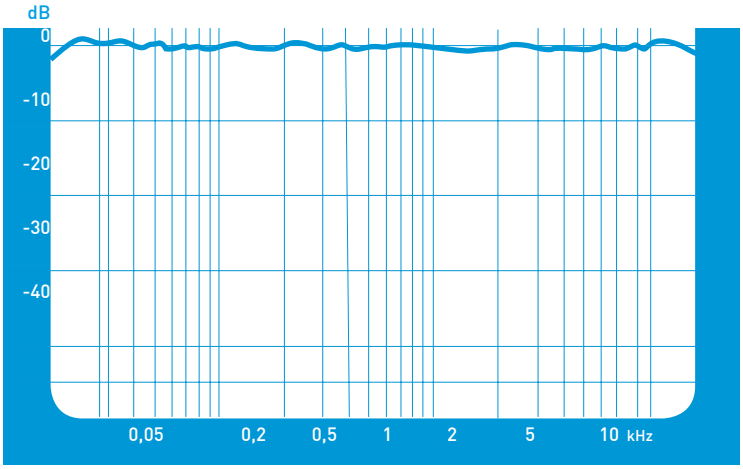
This means a signifi cant improvement of the sound performance even in acoustically „worse" studios. The direct sound signal is much stronger at the ear than the indirect signal components of the reflections due a little horn effect. The digital FIRTEC (TM) equalization allows an absolutely exact linearization of the amplitude and phase response. The C-Reference serie is a completely linear in frequency response with a time-correct structure and so a linear phase response.

These KSD monitors represents a new benchmark in terms of neutral reproduction.

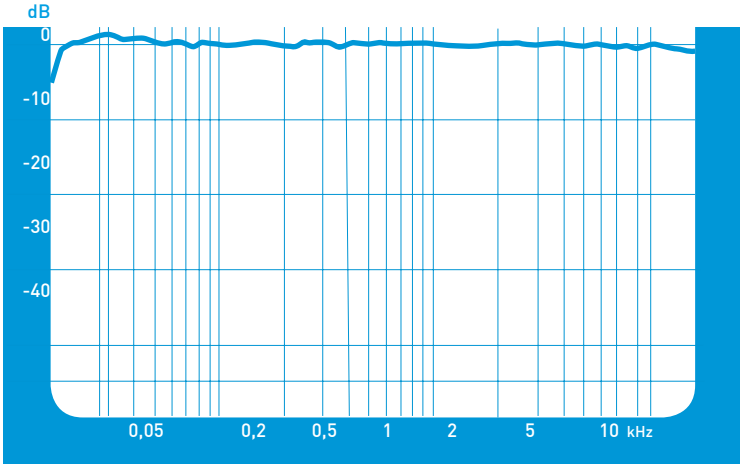


Frequency response of C5-Reference

Diagrams C-Reference

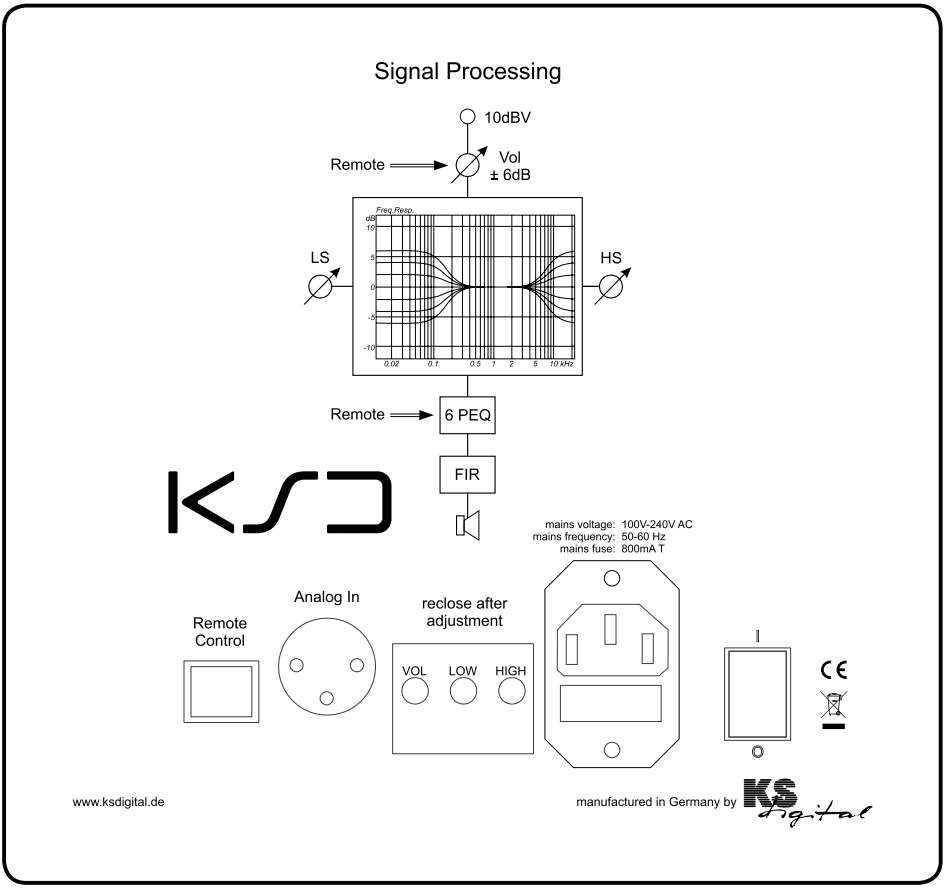


Frequency response of C8-Reference



Frequency response of C88-Reference

Operating elements



If the VOL potentiometer is set up asymmetrically, the volume can be adjusted. If the listening distance is less than one metre, the heights on the HIGH potentiometer may be easily reduced. The loudspeakers can be placed directly on the wall without any loss of sound, possibly the bass volume on the LOW potentiometer has to be reduced slightly. Especially when set up close to corners, the bass response may be exaggerated, which can then be compensated at the LOW potentiometer. Heavily damped rooms and small control rooms can in turn require an increase in bass / treble.

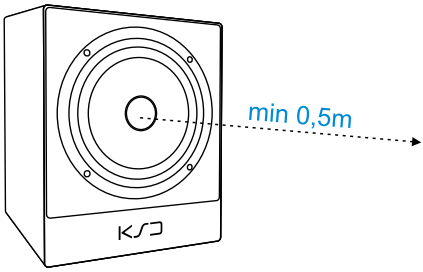
// Optionally available:

KSD RC for adaptation to the acoustics of the control room with 6 parametric filters, timealignment. KSD VOL for direct volume control without additional monitor controller.

Technical specifications

- Coax with special designed membrane and drivers
- FIRTEC
- CAD-optimized Reflex-Port-Design
- active Crossover and phaselinear EQ
- highend/highpower Class-D Amplifiers
- integrated mount
- VOL, High- Lowshelving for adjusted placement
- 6 User-Filter for Room-Response-Compensation

Frequency response	**C5** 48 - 22 KHz **C8** 38 - 22 KHz **C88** 32 - 22 KHz
power	**C5 / C8** 80W / 175W **C88** 80W / 175W / 175W
input	XLR, +4dbV
dimension	**C5** 20 x 24 x 22 cm **C8** 24 x 29 x 31 cm **C88** 48 x 24 x 31 cm
weight	**C5** 8 Kg **C8** 11 Kg **C88** 22 Kg



// Minimum listening distance 0.5 m

Technical specifications

TECHNICAL SPECIFICATIONS:

Model	C5-Reference	C8-Reference	C88-Reference
Construction	Coax	Coax	Coax
AD / DA converter	je 24 bit sigma delta, 64 x oversampling		
Analog IN	je XLR-symmetric +4 dB (V)		
DSP	je FIRTEC™ equalization, FIR-crossover, limiter, 6 User-EQ, patent: 19823110		
Chassis	1" tweeter 6" Bass / Mid-Driver	1" tweeter 8" Bass / Mid-Driver	1" tweeter 8" Bass/Mid-Driver 8" Bass-Extension-Driver
Amplifier	50 W / 175 W peak	50 W / 175 W peak	50 W / 170 W / 170 W
Remote control	KSD - RC	KSD - RC	KSD - RC
Frequency range	48 - 22000 Hz (+/- 3 dB)	38 - 22000 Hz (+/- 3 dB)	32 - 22000 Hz (+/- 3 dB)
Power	Wide range 110 V - 230 V	Wide range 110 V - 230 V	Wide range 110 V - 230 V
Dimensions (B x H x T)	200 x 245 x 220 mm Höhe inkl. Stand 290mm	240 x 290 x 310 mm ohne Stand	480 x 240 x 310 mm
Weight	11 kg	12 kg	22 kg
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Speaker set up

3. The greatest possible proportion of the sound energy to the ear should be formed by the direct sound.

Do not choose a listening distance that is too large, and always choose one relative to the size of the speaker. For example, a small 70cm speaker listened to at a 5m distance leads to an increased perception of the acoustics of the listening room. The dispersion of the speaker plays a major role in the determination of the optimum listening distance. A KS cylindrical wave emitter achieves more direct sound to your ears than a classic omni-directional bullet horn, and therefore a somewhat larger distance can be achieved. All KS speaker models use our exclusive D' Appolito waveguide designs, which are different than any other waveguides ever created. These disperse much more directed sound than the classic round bullet horn. It is important before any purchase to discuss these aspects with a professional, so you get the optimal speaker at the optimal listening distance!

4. Select the optimal distance and space for the back wall and the sides.

If the distance between the rear and side walls (behind or to the side from the speakers) is not infinitely far away (more than 5m (15 ft)), then the effect of these walls has to be considered. The physical basis of these considerations is the wavelength. It two waves of the same size are added in phase with each other, the result is 6dB louder. If they meet in reverse phase (180 degree phase shift), there is a complete cancellation. Side walls as well as back walls make an ideal reflecting surface for low frequencies with wavelengths from 10m (30 ft) to 3m (10 ft). All woofer drivers disperse omnidirectionally, regardless of being mounted on the front, the side, or the back of a box. The low-frequency wave will always reach directly from the monitor to the ear. At the same time, this wave is radiated to the walls and reflected from there to the ear. The wave travels a detour to the wall, in that it reaches our ears "on the rebound." The detour creates a phase shift in the wave.

An example:

A 3 meter (10 ft) long wave

a) Will be emitted directly to the ear, and

b) Reflected to the ear from a rear wall. For this example, let's say the distance of the speaker from the rear wall is 0.75 meter = 30". Now, in the ear of the listener, both waves are added, the direct one and the wave which did the detour—and the detour is 1.5 meter = 5 ft (detour: speaker to back wall = 0.75m = 30" + rear wall to the speaker = 0.75 meter = 30," so in total 1.5 meter = 5 ft). But 1.5 meter = 5 ft is exactly half the wavelength, leading to cancellation with the directly emitted wave, as seen in the graphic.

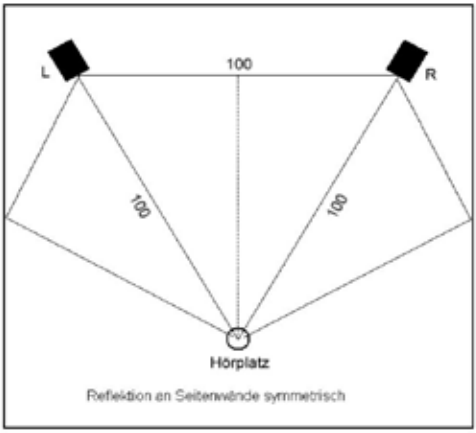
In reality, this does not lead to a complete cancellation, as the wave reflected from the rear wall is a bit dampened, and many other reflections somewhat weaken this cancellation. Nevertheless, this tone at the listening position is quieter than its neighboring tones. Things can get more extreme if the side wall is also 0.75m = 30" away, so possibly the same conditions prevail for both speakers. A simple recommendation is as follows:

The distances of the speakers from the rear wall and side wall should never be the same, and the same counts for the distance of the left speaker to the left side wall, which should be different from the right speaker to the right wall. The symmetry mentioned in #2 above relates most ideally to smaller speakers (such as the D60 or D80), as the room will be larger than the wavelengths of the high and mid frequencies being output. For low frequencies, symmetry becomes more of a problem, as there will be standing waves

that occur in the mathematically-related spots of the room (for example, the exact middle of a square room will have the most problems with standing waves). With a separate subwoofer, it can be asymmetrically placed to help with this issue, but with a sub built into the speaker, bass trapping may be necessary, as well as offsetting the speakers as explained in this section. The stereo triangle between the listener and both speakers (explained in #1 above) should still be maintained.

Low and High Shelving

As we show above, the reflected energy of the walls does matter. If the speakers are positioned anywhere in an open room, the settings of all filters should be in the "neutral line-up" which is 12 o'clock position. If the installation is close to walls (the distance from wall to speakers is under 2m = 7 ft), it leads to an increase in bass energy, which can be reduced in our speakers with the help of the Low Shelving controller. A corner installation leads to a further increase in bass energy, which can be handled by using the Low Shelf to greater extent. In the same sense, you can adjust the treble energy with the High Shelf, based on the spatial conditions of the room.



5. Handle the buildup of nodes in the bass range.

Finally, a few comments on the buildup of nodes in the listening room. Nodes are standing waves that are created because the control room forms too narrow of a shape for the emitted wavelengths in the low frequencies. Basically, there isn't much that can be done about it. You should try to build the room so that the most unpleasant consequences do not appear too intensely at the listening position. It does not matter if the back of the room has a considerable bass boost from a loud bass reflection—this is not our listening position. A good node distribution is obtained if the room nodes aren't excited in only one place. Therefore, KS has designed many speakers wherein the bass diaphragms are mounted at different heights, so the nodes become excited in a more chaotic state and are not as pronounced. The advice described under topic 4, regarding the distances from the rear and side walls, affects the node distribution and intensity favorably. One or more additional subwoofers can also significantly reduce the problem with nodes at the exact listening position, as well.

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