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# Kling & Freitag Sona 5

***Compact sound reinforcement speaker with audiophile quality and PA power***

Compact sound reinforcement speakers in plastic housings are a kind of universal tool for many installations. In hotel bars, below the balcony of a theater or in the peripheral areas of a discotheque – they have a lot of uses. This is mirrored by a broad choice of units making it quite difficult to find the right speaker for a specific task. At first sight the differences appear rather small except for the prices. But when the candidates are heard or seen in real life the choice narrows quite a bit.

Kling & Freitag from Hannover, Germany, are known for their top-quality sound systems in a lot of sizes and have now entered this field as well. Typical for their approach they have designed their own system from scratch to match the most discerning demands without compromise.

The result is the Sona 5, a passive two-way speaker with a 5" LF driver and a 1" tweeter in a plastic enclosure with swivel arm for wall-mounting. So far this is not unusual. Looking closely at the Sona 5, the enclosures look and feel stands out with the impression of high quality and a solid feel. The surface is completely level and coated with textured lacquering. There are no seams or joints or other hard-to-clean structures. The form with rounded edges and a slight narrowing to the back is both unobtrusive and elegant. Kling & Freitag finds the right word with the description "designed for integration in stylistically demanding applications". The enclosure is made of moulded frame-retardant synthetics confirming to UL94 classification V0. The basic material is otherwise used for tough temperature resistant parts like car radiator grills and therefore the speaker will keep its form for a long time even under tough conditions.

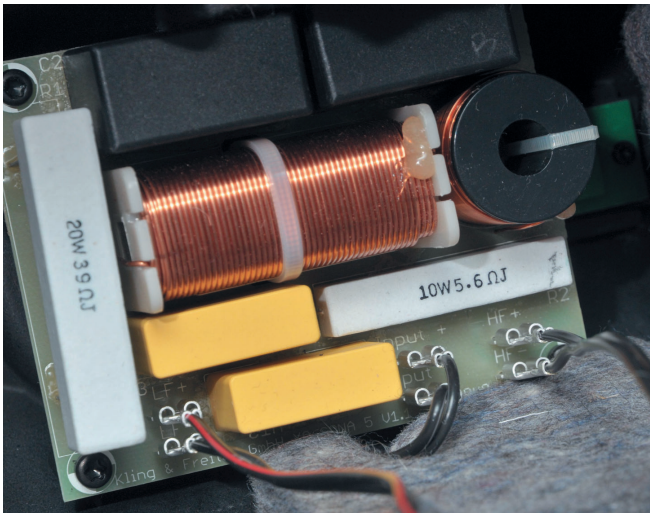
Each speaker is fitted with a unobtrusive swivel arm with mounting plate, allowing free positioning of the speaker with up to 90° tilt in horizontal and vertical planes. Great care was taken to allow reliable fixing of the ball-joint in position. There is no danger of a mounted speaker slowly tilting downwards, which would necessitate repositioning after a while. At the back there is a connection for a chain or a arresting cable as a safety measure, which is proscribed by law for speakers mounted above an audience. The elctrical connection is done with the clamp connectors typical for fixed installations. The Sona 5 features two clamps each in parallel to enable the cabling to extend to the next speaker.

The front is protected by a easily interchangeable front grille.

## Interior structure

That's it regarding the exterior. The really interesting parts are the internal workings of the Sona 5. When the grille is taken off, the complete front of the unit can be taken out of the enclosing shell by opening six screws. Both drivers can be recognized at first sight as modern

**A Sona 5 taken apart: the enclosure is made of the frontal plate and the actual shell. Both are made from flame-protected plastic.**




**The passive crossover of the Sona 5 with high-quality coils, 250 V film capacitor and solid power resistors.**

neodymium systems. To control heat especially in the small tweeter, the neodymium magnet received a heat sink at the back to take care of sufficient dispersion of lost heat. The elctric loss is not really big with a tweeter, but it can be enough to heat up the small neodymium magnet to a point where the temparature difference is not enough anymore – raising the danger of burn-out. Comparing size and weigth of ferrite and neodymium magnets of equivalent power, the ferrite magnet is of course a lot bigger and heavier, which is a disadvantage in almost every respect but dissipation of heat. But in combination with the heat sink the tweeter can safely dissipate his heat to the surroundings. For a improved heat motion from coil to magnet the air vent of the cage is filled with a ferrofluid. The low frequency speaker does not show the problem so clearly, since the voice coil is much more powerful and therefore better protected against burn-out and the magnet is still much bigger than the one of the tweeter even with the use of neodymium. Dangers to the LF unit could result from excessive excursion of the membrane. K&F has taken care of this by designing the unit in a way that makes the driver act as a kind of compressor, reducing the excursion to acceptable size at low overload while continuing to function. The protective measures together protect the speaker to the extend that an electronic protection became unnecessary. The tests of maximum levels have shown that this actually works well. In several tests with rising power levels the speaker ceased to project more loudly, but was otherwise undamaged.

Looking at passive crossover of the Sona 5, we clearly recognize how strictly K&F deals with their claims regarding their power rating. Similar crossovers are found in big PA-systems by other manufacturers. In any case you will not find molten coils or burnt capacitors in a Sona 5.

From the acoustic point of view the Sona 5 is designed as a combination of a bassreflex system in the bass sector with a tweeter with waveguide for the highs. The bassreflex opening was moved to a sub-optimal position at the upper edge of the enclosure because of size restrictions. The speaker is tuned to ca. 70 Hz which enables at least some level in the low frequencies. The crossover to the tweeter is at 1.7 kHz and therefore rather low for a small 1" speaker. Thanks to the waveguide developer the sensitivity of the tweeter could be raised by 9 dB in this critical area according to developer Henry Dahmen. This made the low crossover frequency possible without problems.

Before we move on to the test results, here is a short look at the official specs of the Sona 5: size is 140 × 230 × 170 mm (WxHxD) and the weight is 2.8 kg. Nominal power handling according to IEC 268-5 is quoted as 100 Watt and the nominal impedance is 16 Ohm.

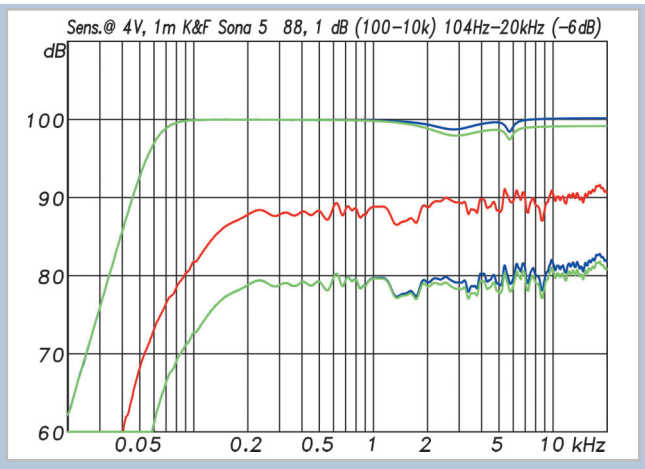
## Test results

The spec sheet shows two curves for frequency response and impedance in addition to the pure numbers. Both graphs are big and clear with good scaling and were measured under reproducible conditions. Both graphs are exactly right. This can not usually be taken for granted – especially with small speakers.

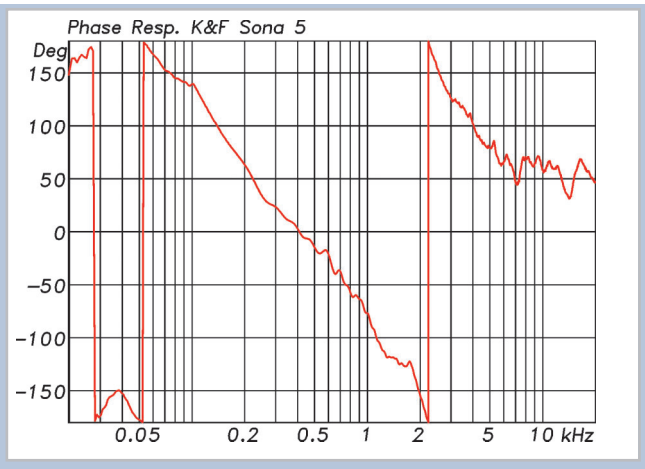
Picture 1 shows the frequency response of the Sona 5 measured in our own lab with sensitivity (red) for 4V/1 m equivalent to 1 W/1 m for a 16 Ohm system. The filter functions which can be chosen with the K&F CD44 controller, which can be used as an option with the Sona 5, are shown in addition to this. Next to a few minimal frequency corrections there is also a filter of the 4th dgree at 60 Hz, which is mainly used to protect the speaker against high signal level below the tuning frequency. The matching phase response of the Sona 5 without controller is shown in picture 2 with 360° phase change each at the crossover and in the low frequencies caused by the acoustic highpass characteristic of the system. The phase change at the crossover is somewhat stronger than it would be expected from a crossover of the second degree alone, since a part of the acoustic filtering of the speaker projection is added here.

The impedance chart shown in picture 3 shows a bassreflex tuning according to the book just below 70 Hz and an impedance low of 9 Ohm at 290 Hz. The latter is a bit critical for a speaker with nominal 16 Ohm, since there should be no values below 12.8 Ohm according to the norm. But the range of this minimum is quite small so that the value can still be acceptable when four speakers are used in parallel at one output with modern amplifiers.

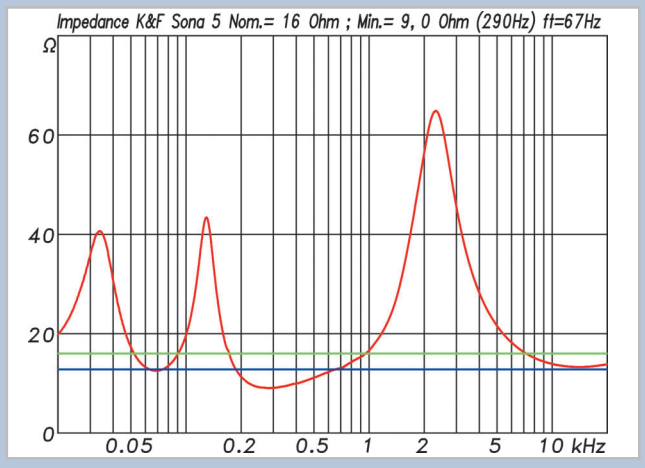
For the test of the maximum levels in picture 4 our lab system was set for a limit of 200 W into 16 Ohm (equivalent to 80 V). Picture 4 shows the levels reached re-calculated for a distance of 1 m. The blue curve was the result for a maximum of 3% distortion, the red curve is for 10%. Where blue and red curves are joined the 10% limit was not reached before the upper power limit of 200 W stopped the test. The third (green) line in picture 4 shows the calculatory maximum level resulting from sensitivity and 200 W power. At the 10% limit the calculated value is reached in serveral areas. Below 1 kHz distortion caused by the membrane movement of the LF speaker adds to the picture with a clear difference between the 3% and the 10% curves. All in all according to the used measurement method with 185 ms long sine bursts the SONA 5 is good for levels of 110 dB SPL from 180 Hz upwards. The possible peak SPL is typically about 6 dB above this. Both are overwhelmingly good values for a speaker of this size. In addition there is a very even flow of the curves – without any weaknesses. The two final test deal with the directivity of the Sona 5 in the horizontal (picture 5) and vertical (picture 6) plane. The isobarics show a broad dispersion below



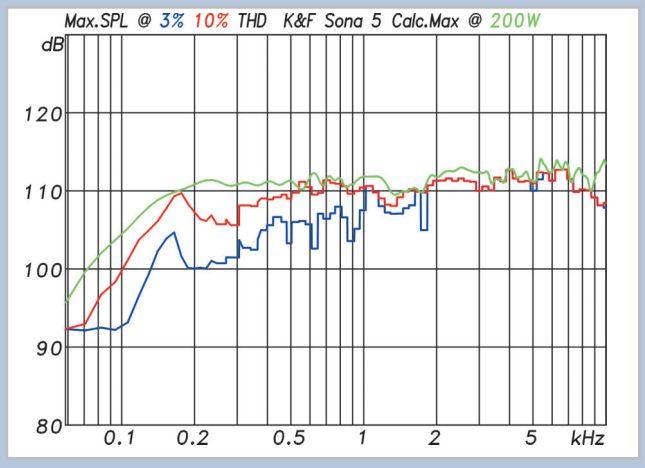

**Pict. 1: Frequency response and sensitivity of the Sona 5. Red: speaker without controller, green and blue: with two alternative filter functions in the controller. On top we find the matching filter functions of the controller CD44, which only have to make small corrections for the Sona 5.**



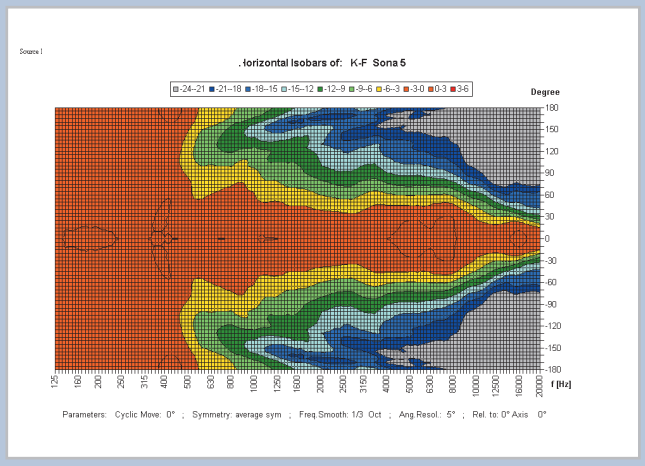

**Pict. 2: Phase response of the Sona 5**



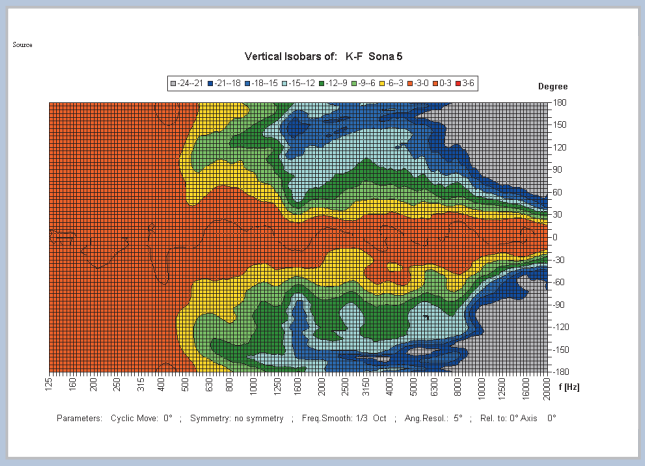

**Pict. 3: Impedance chart of the Sona 5. The speaker is quoted as 16 Ohm system (green) in the spec sheet. The minimum is at 9.0 Ohm as shown in the data sheet. If the norm is strictly applied, there should be no values below 12.8 Ohm (blue). The bass reflex system is tuned to 67 Hz.**




**Pict. 4: Maximum SPL curves of the Sona 5 for 3% (blue) and 10% (red) THD as well as the calculatory maximum level at 200 W power (green).**




**Pict. 5: Horizontal isobarics of the Sona 5 with a –6 dB directivity of on average 125° between 1 kHz and 10 kHz. Above 8 kHz the dispersion narrows a bit.**




**Pict. 6: Vertical isobarics of the Sona 5 with a – dB directivity of on average 105°. There is a slight downwards tilt of about 7°.**

**View into the Sona 5 without LF-driver**

500 Hz (as was expected) before narrowing up to 2 kHz and then staying more or less constant. Above 8 kHz there is additional narrowing mainly in the horizontal plane. From the isobarics shown here an average value of 125° × 105° can be calculated for the frequency range of 1–10 kHz. In the vertical plane there is also a slight bias of 7° downwards when looking at the -6 dB Isobarics. In the spec sheet we find the Sona 5 specified with 120° × 90°, which fits well with the isobarics depending on the method of calculation.

## Auditory Test

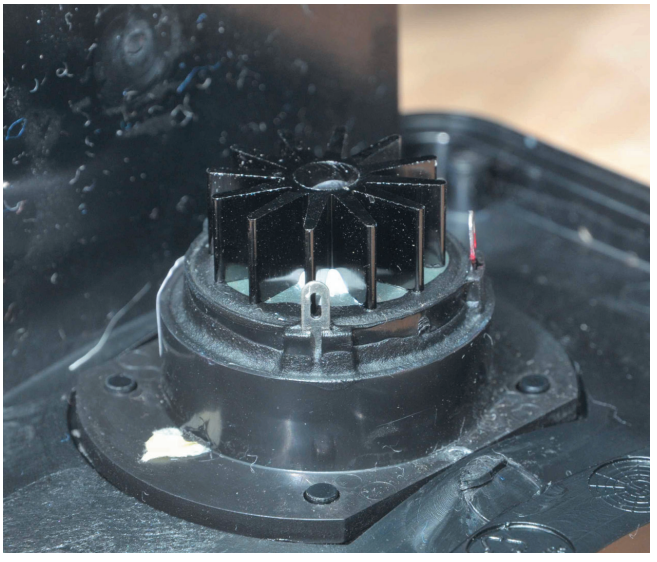
For our listening test the Sona 5 was initially integrated in a test series with small studio monitors, where it was heard at a distance of 2 to 4 m under mainly good and neutral acoustic conditions. Two significant differences were detected: The Sona 5 could handle much higher levels than the other speakers from the test field, but could not match the bass performance of the others without additional equalisation. This is not rally a surprise since all the other speakers where already equalised with their own internal electronics. With slight use of a filter (+6 dB at 80 Hz) the Sona 5 could be brought in this direction, which was very positively noticeable, without leaving an impression of the speaker being overdriven. Even when brought to its limits, the sound of Sona 5 stays quite acceptable for a long time. Combined with a subwoofer at a frequency of 100 Hz the Sona 5 moves into completely new dimensions which suggest the use in gastronomic applications and in the side rooms of diskotheques and clubs.

## Conclusion

With the Sona 5 Kling & Freitag now also offers a compact universal installation speaker with plastic case and two-way system. The prejudice "another plastic thing from the Far East with just another label" turns out to be completely wrong when one knows Kling & Freitag and the ambitious approach of the company. The Sona 5 is a highly professional sound reinforcement speaker completely designed in Hannover, Germany, which can be clearly recognised in every aspect. Perfect finish and quality, unobtrusive design, high-quality components, excellent test results and a very good listening impression in the full range up to the highest levels. It should be clear that such a speaker can not be made available for 50 Euro per pair. Serious tools have their price which they are worth. In the case of the Sona 5 we are talking about € 500,– per unit.

*Text and lab tests: Anselm Goertz*
*Photos: Dieter Stork (1), Anselm Goertz*
*Translation:Alex Merck*

**Tweeter with waveguide integrated into the frontal plate to control directivity and to boost the sensitivity of the tweeter.**



**Tweeter of the Sona 5 with heat sink on the neodymium magnet for better dispersal of heat.**