

ZENSOR AX

WHITEPAPER



IN ADMIRATION OF MUSIC

INTRODUCTION

When DALI introduced the ZENSOR series in 2011 the goal was to introduce genuine - but affordable - hi-fi in a compact and stylish design. DALI believes that with the award winning success of the ZENSOR series we have fulfilled this goal. Now DALI is ready to take this to a whole new level.

To reach the full potential of the current ZENSOR models, it is important to match them with high quality electronics. This however, requires space, complicated setups and an array of often unwanted cables. This complexity often puts off a number of customers who require a much more simple to use, elegant solution; therefore robbing them

of the chance to experience what true hi-fi can bring to the music and movie experience.

With the new DALI ZENSOR AX series however, this no longer need be the case. Capable of delivering all of the genuine DALI high quality sound of the existing ZENSOR speakers, the new AX models also have the added benefit of a fully integrated digital amplifier. 100% optimised to deliver the perfect signal to the two ZENSOR speakers, it has the refinement to get deliver even the tiniest detail in the audio signal, and the power to play at party levels of loudness if required. DALI ZENSOR AX series consists of two models;

The compact ZENSOR 1 AX is perfect for use on a shelf, mounted on the wall or on a pair of DALI's CONNECT E-600 stands.

The floor standing ZENSOR 5 AX offers more bass and an even larger soundstage, perfect for a larger living room.

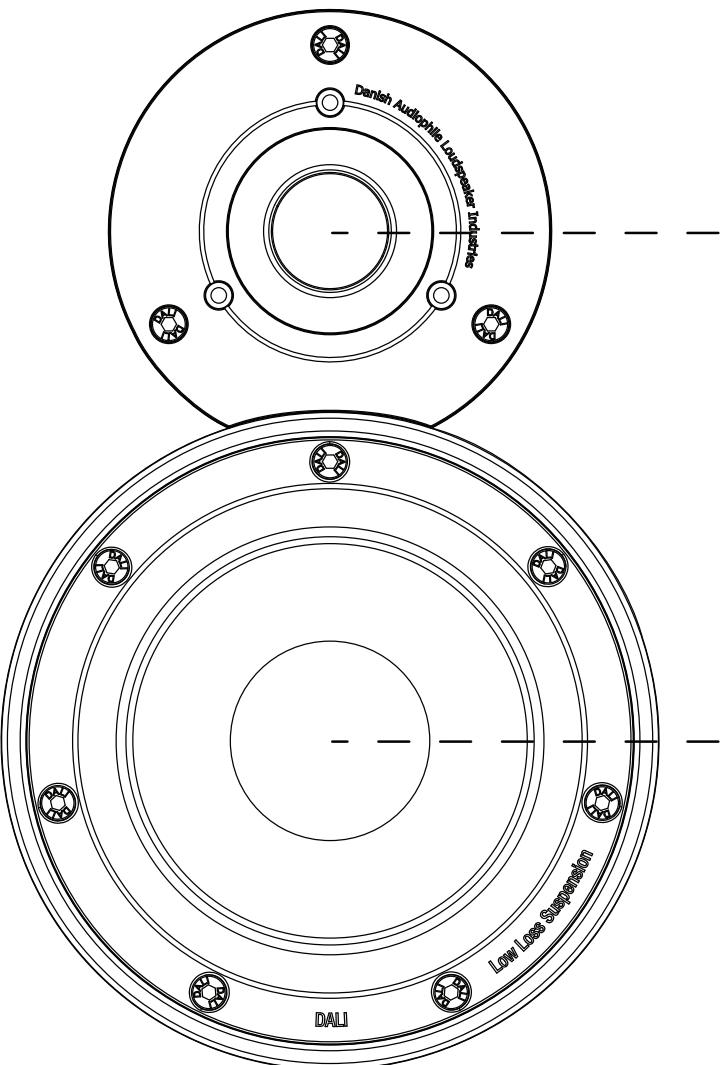
Both models include a 2 x 50 Watts Class-D amplifier with Bluetooth (Apt-X), Optical and Analogue input, and also feature a subwoofer output should you wish to enhance your listening experience further.



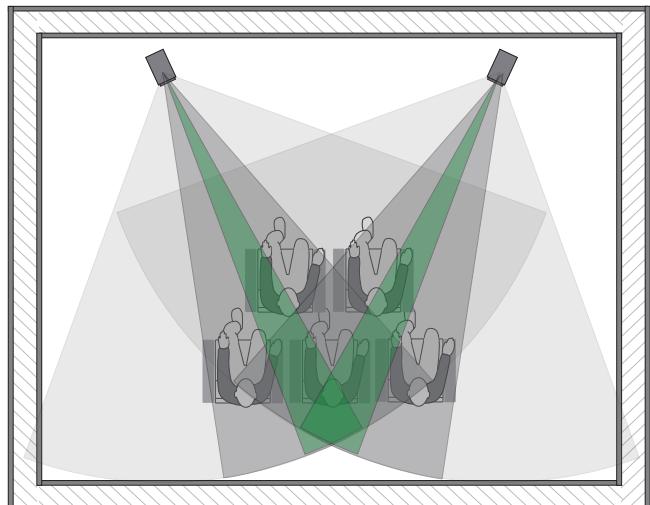
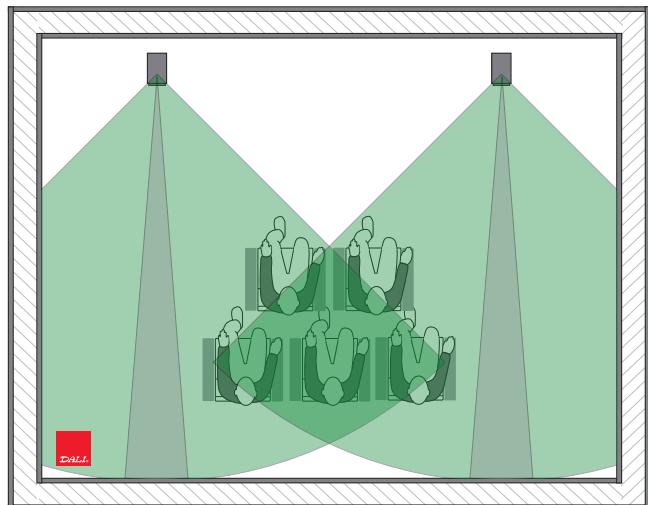
WIDE DISPERSION

DALI makes it easy to integrate your loudspeakers into any room. The driver materials, crossover design, and the geometry applied in the ZENSOR AX series have all been carefully selected to achieve a wide dispersion pattern in the listening area. Thus you will experience a well-integrated sound even when listening at a significant off-axis angle. And, as you are rarely seated directly in front of the loudspeaker when listening to music, this can be a very useful feature.

One of the added benefits of a wide dispersion loudspeaker is seriously reduced harmonic distortion and diffractions causing frequency distortion, as these will always be stronger in an on-axis response. That is also the reason why practically all DALI speakers are designed not to be toed-in.

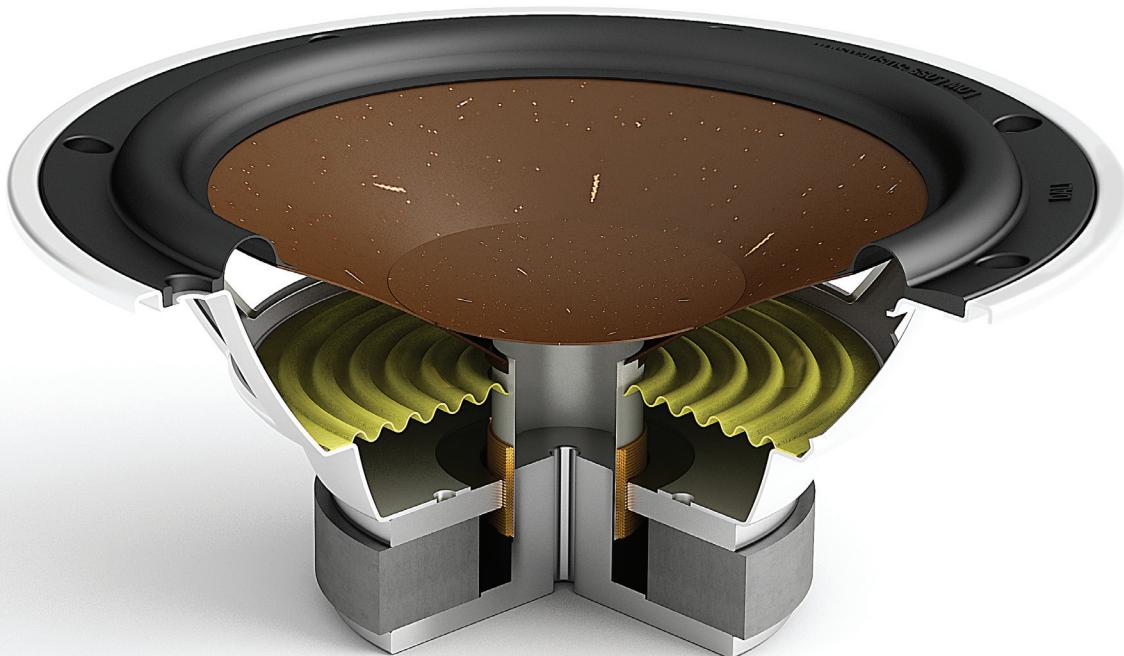


The tweeter and woofer are placed close to each other for optimum integration. Using the ZENSOR 1 AX as an example the distance equals half a wave length a 3000 Hz, ensuring the best possible integration right at the crossover point.



DALI speakers are build for wide dispersion, filling the room with the best quality audio and enlarging the listening sweet spot.

WOOFER



Cut-through showing the woofer developed for the ZENSOR series.

At DALI we believe strongly in reproducing the recorded signal. No more, no less...

Consequently we believe in the necessity of reproducing not only the frequency contents in the signal, but also the dynamics in all its aspects – ranging from the most subtle micro details to high level bursts.

The ZENSOR AX speakers have been engineered accordingly. Like all DALI drivers dedicated to reproducing the

delicate midrange frequency area, the ZENSOR AX woofer features wood fibre cones. This blend of fine grain paper pulp, reinforced with wood fibres, creates a stiff yet light-weight and well-behaved structure. In combination with a low-loss surround and spider suspension, this cone reproduces the smallest details in the signal – unfiltered and with ultra high accuracy.

The cone area of the drivers in the DALI ZENSOR AX series is larger than the most common market

standard. ZENSOR 1 AX and 5 AX are equipped with 5¼" woofers. These woofers feature an effective cone area approximately 10% larger than traditional 5" drivers. This allows for the same sound pressure level to be generated utilising a lower cone excursion. It also allows for a higher maximum sound pressure level and – most importantly – it leads to an effortless reproduction of the dynamics in the music.

TWEETER



Ultra-light soft dome tweeter developed for the ZENSOR series ensures effortless and unbiased reproduction of the finest details.

It is vitally important that the tweeter be able to render high frequencies with high accuracy. This means very short excursions, but at high speed, - or rather – with high acceleration. Consequently a low moving mass and a strong motor system is required for this to be achieved. To improve power handling, reduce power compression, and to support a straight-line excursion of the voice coil, the magnet systems used incorporate

ferro-fluid. A high quality (220 gauss type) is used with the ZENSOR AX series for long term stability in a saturated field.

The geometry of the tweeters front plate has been specially optimised to create the perfect working conditions for the soft dome. This results in a combination of an extended frequency response with wide dispersion and low coloration.



The ZENSOR tweeter is constructed on the basis of an ultra light-weight weave fabric. Compared to most soft dome tweeters in the market the DALI dome material is less than half the weight; 0.056 mg per mm².

AMPLIFIER

Driving the ZENSOR AX series is a fully digital Class-D 2 x 50 Watts amplifier.

Making full use of the purely digital signal path, the Optical input reads any TOSLink signal with a sampling rate between 32 – 176.4 KHz at a bit rate from 16 to 24 bit. The Optical signal is passed to the DSP and then onwards to the amplifier.

Both the analogue signal and the signal from the Bluetooth interface is passed through the A/D converter and converted from its analogue state into a 24 bit 96 KHz digital signal. Sampling

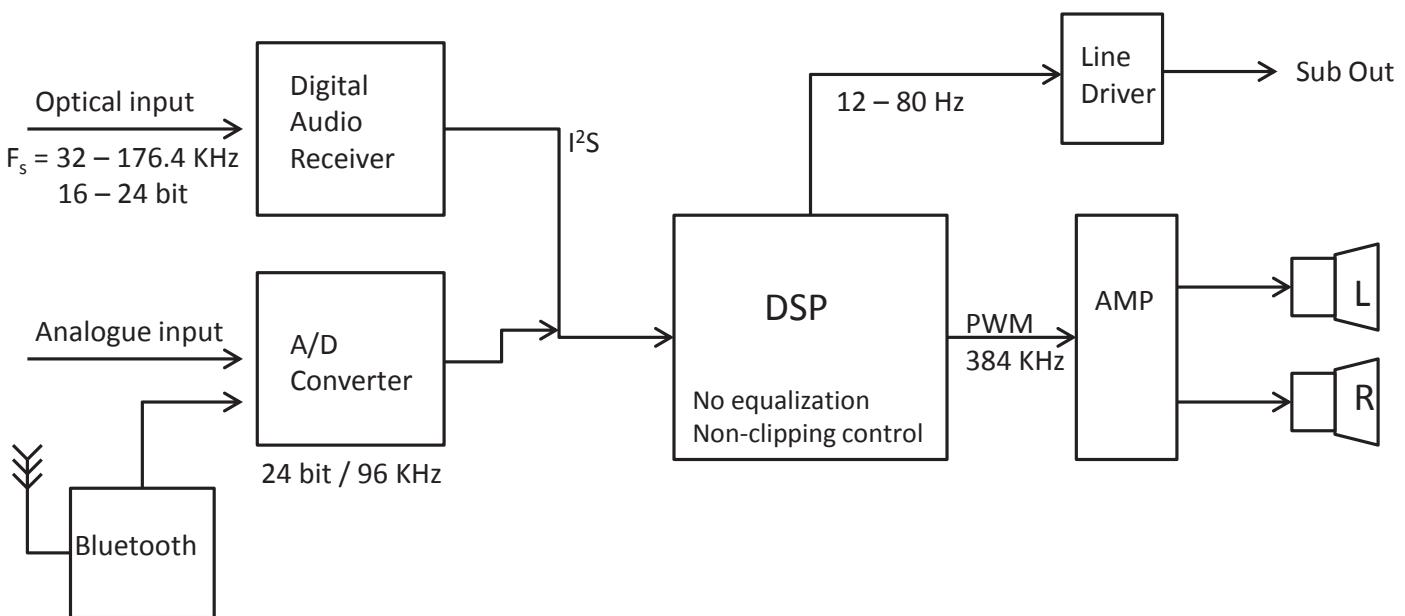
the analogue signal from the Bluetooth receiver helps make any noise more random and way more musical. This together with the high quality Apt-X compression format supported by the ZENSOR AX helps keep the Bluetooth audio signal at the best possible quality level. Once the signal has passed through the A/D converter, it is then passed onto the DSP.

DALI believes in a hands-off approach to the audio signal and therefore no equalisation is performed on the signal by the DSP. The main function of the DSP is to handle non-clipping

controlling, thereby keeping the signal clear and powerful at any frequency.

The amplifier receives a PWM signal at 384 KHz from the DSP, which is then digitally amplified by the 50 Watts RMS Open Loop amplifier. The amplified signal is then received by the passive crossover that distributes the signal to the drivers.

Feeding every component in the amplifier is the auto sensing switch mode power supply, which is capable of working from 100V to 240V.



The fully digital Class-D amplifier delivers high quality audio from Bluetooth, Analogue and Optical sources.

CABINET

The cabinets for the DALI ZENSOR AX series meet expectations - and then some.

CNC machined MDF is then dressed in a top-of-the class laminate, forming the principles of the AX series.

The floor-standing models also feature strong internal bracing to reduce structural resonances.

In order to optimize timing, the cabinets are fitted with acoustic damping material internally along the sides, top and bottom - but not on the rear side of the front baffle. This then creates a more direct contact between woofer and bass port, therefore limiting the delay of the output from the bass port

compared to the output from the driver itself. The audible result is a more precise bass and increased 'attack' in the midrange.

The front baffle is finished in a high-gloss black or white lacquer, perfectly complementing the aluminium details. Covering this you will find a removable acoustically transparent front grille.

High quality DALI terminals secure maximum grip and signal with the speaker cables, whether bare-end or fitted with banana plugs.

All DALI ZENSOR AX models are available in a choice of Light Walnut, Black Ash or White finish.



Strong internal bracing, selective placement of acoustic damping and front firing bass port is all important parts in the ZENSOR AX's ability to deliver precise bass, and 'attack' in the midrange.

TABLE 2 - TECHNICAL SPECIFICATIONS

	ZENSOR 1 AX	ZENSOR 5 AX
Frequency Range (+/-3 dB) [Hz]	53 - 26,500	43 - 26,500
Maximum SPL [dB]	104	106
Crossover Frequency [Hz]	2,900	2,400
Crossover Principle	2-way	2-way
High Frequency Driver	25 mm soft dome	25 mm soft dome
Low Frequency Driver	1 x 5¼"	2 x 5¼"
Enclosure Type	Bass reflex	Bass reflex
Continous IEC Amplifier Output [RMS watt]	2x50W	2x50W
Input Impedance [Ω]	12.6K	12.6K
Input Sensitivity [mV]	300	300
Connection Input(s)	3.5mm Stereo mini jack, Optical (Toslink)	3.5mm Stereo mini jack, Optical (Toslink)
Wireless input	Bluetooth™ Apt-X	Bluetooth™ Apt-X
Connection output	Sub out	Sub out
Amplifier Type	Fully digital class D (Open loop type)	Fully digital class D (Open loop type)
Maximum digital resolution [bits/KHz]	24 / 96	24 / 96
Magnetic shielding	No	No
Recommended Placement	Wall/Shelf/Wall	Floor
Input mains	Universal mains 100-240V	Universal mains 100-240V
Maximum Power Consumption [W]	160W	160W
Standby Power Consumption [W]	<0.5W	<0.5W
Dimensions (HxDxW) [mm]	274 x 162 x 240	840 x 212 x 282
Weight [kg/lb]	4.6 / 10.1	11.0 / 24.3
Accessories Included	Mains cable, rubber feet, wall bracket, rubber bumber, remote control, manual, right speaker wire	

All technical specifications are subject to change without notice.