

DALI LEKTOR[®] Series

Technical Whitepaper



IN ADMIRATION OF MUSIC

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Introduction

Introducing the DALI LEKTOR® Series sets new benchmarks for our 25 years of great Danish speaker design. With two floor standing models, four compact speakers and a subwoofer the LEKTOR® Series is a versatile speaker series that will suit most needs for capable and entertaining sound in a home stereo- or multi channel audio system.

The LEKTOR® Series is positioned between our highly acclaimed IKON® Series and the entry level CONCEPT Series.

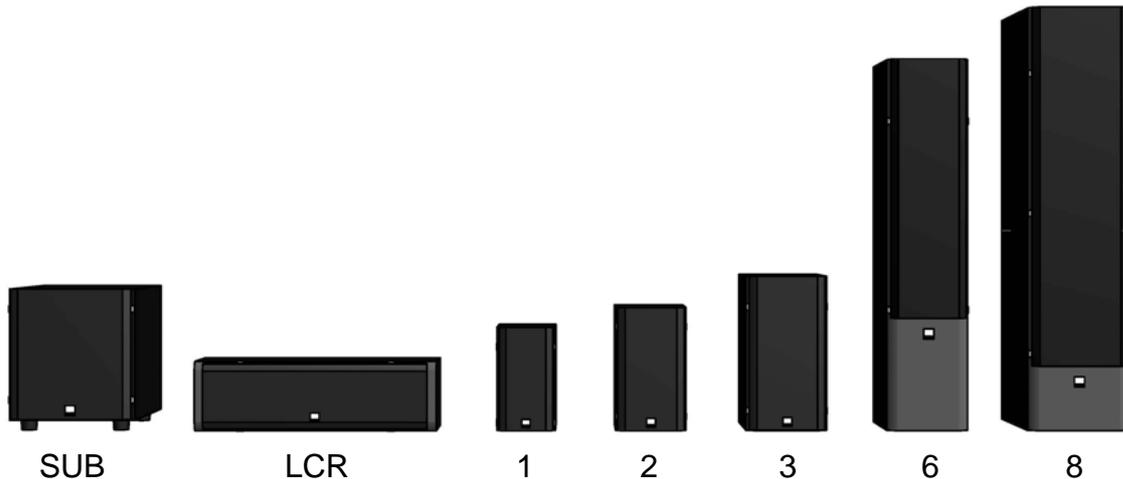


Figure 1, The LEKTOR® Series lineup.

The LEKTOR® Series has inherited a lot of features from the IKON® Series and implemented at an even more attractive price point. The main features of the LEKTOR® Series are:

- Oversized 28mm light weight soft dome tweeter with aluminum faceplate.
- Woofers/midranges with wood fiber cones, oversized magnet systems and low loss rubber surrounds.
- Medium Density Fiberboard (MDF) cabinet with two furniture grade laminate finishes, lacquered baffle.
- All models are bass reflex ported.
- Crossovers with high quality audio grade components.
- The crossovers are mounted on the binding posts for short signal path.
- Single wire binding posts (accept 4mm banana plugs or bare cable ends).
- Grilles are mounted with decorative aluminum snap locks; the slim grilles are optimized to minimize reflection/diffraction from the grille.
- Easy amplifier load – will work excellent even with budget amplifiers.
- Wall brackets on all compact models.
- Spikes and/or rubber feet included with all speakers.

In the following you can read a more thorough description of the design and development principles used in the LEKTOR® Series.

Speaker Drivers

Development of the drivers for the LEKTOR® Series has been one of the most important tasks in the engineering process, since it is a key factor in achieving great performance from the loudspeakers. With 25 years of history within speaker design it should be an easy task – but it never is. Designing the new drivers for the LEKTOR® has been a challenge to push technology and performance even further. All LEKTOR® drivers are designed to match our design philosophies and the specific loudspeaker models.

Low Frequency Drivers

All woofers and midrange drivers use a wood fiber cone with low mass (approximately 30% lighter than a typical cone at the same size) and optimum strength and stiffness – the result is uncolored, clean sound reproduced with great speed. For structural stiffness the dust cap in the middle of the cone is inverted.

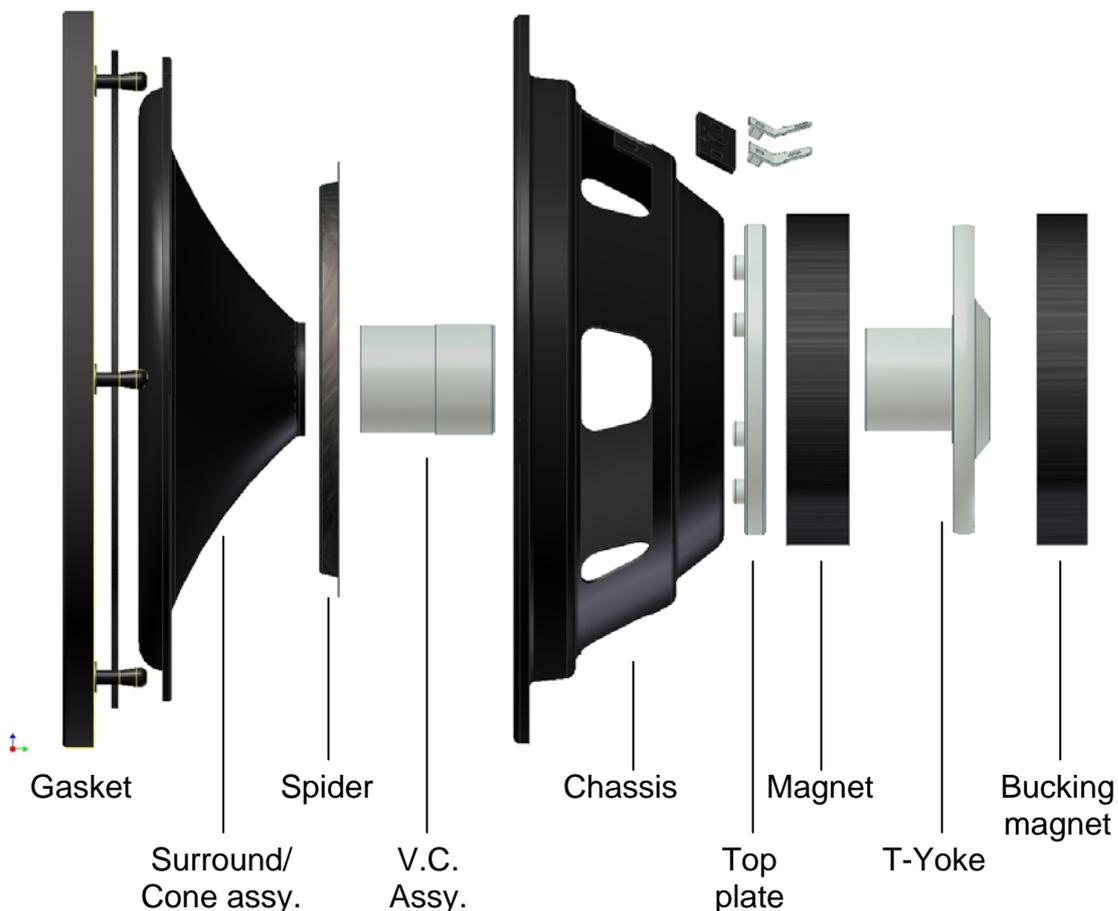


Figure 2, Exploded view of 6½” woofer/midrange.

At low frequencies and high volume levels there is a great need for long excursion of the cones. Therefore the low loss rubber surrounds¹ and spider holding the cone-

¹ The low internal loss of the rubber material itself will help reproducing the subtlest details in the music – the details are not ”absorbed” and transformed into ”heat loss”.

assembly have been optimized for long excursion without collapsing and generating distortion.

Despite the fact that the cone assemblies are very light, we have chosen to use a very powerful motor system to make sure that the cone assembly can start and stop promptly. Thereby it can transform the tiniest subtle details in the electrical signal to mechanical movements (and thereby an acoustical signal). To get a high magnetic flux working on the voice coils in the gap, 25 and 30 mm voice coils have been used together with double magnets working on the voice coil. Another benefit of using a large voice coil diameter is that power handling is increased.

To avoid air compression in the cavity behind the dust cap and around the voice coil, the T-yoke of the magnet system is vented. Thereby air can't get trapped in the cavities in the magnet system, which will reduce compression.

The woofers and midranges are mounted without visible screws, which gives a clean and minimalist visual appearance.

High Frequency Drivers

In the LEKTOR® Series we have designed two tweeter systems with excellent dynamic capabilities, plenty of headroom and high power handling. At the same time, they have been optimized for off axis response and timing characteristics that will make a seamless blend with the response from the woofer/midranges possible.



Figure 3, Exploded view of 28mm neodymium tweeter for LEKTOR® 1.

To optimize the dynamics and headroom capabilities, a large 28mm dome/voice coil size has been chosen. In comparison with a standard 25mm dome, the 28mm dome tweeter has approximately 25% more surface area, and thereby it can obviously move more air. Or, said in another way – the dome should not move as much to reach a given sound pressure level – motion will thereby be more controlled and consequently reproduced sound will be more precise. A larger surface area also leads to better low frequency-capabilities exactly because it can move more air.

In the development of the tweeter systems we have also focused very much on having a light weight design so that the benefits of having a larger surface area are not wasted. We have used a dome material that is up to 25% lighter than comparable materials typically used for domes. Due to other weight reductions in the dome assembly we have actually managed to reduce the weight up to 40% by comparison with standard materials. Due to the low mass of the dome assembly, very fast movements are possible – the upper limiting frequency is 27 KHz.

The tweeters have decorative aluminum faceplates with black acoustical lenses around the dome itself. The shape of the acoustical lens in combination with the characteristics of the dome has made it possible to have very good off axis characteristics.

By using an oversized voice coil, the power handling is increased. But it has actually been taken further by adding low viscosity Ferrofluid[®] round the voice coil in the voice coil gap. Thereby thermal conductivity is increased approximately 5 times, eliminating spontaneous or continuous voice coil temperature rise – the heat will be dissipated by the magnet structure. Ferrofluid[®] is also known as “magnetic oil”, oil filled with micro scale magnetic particles.

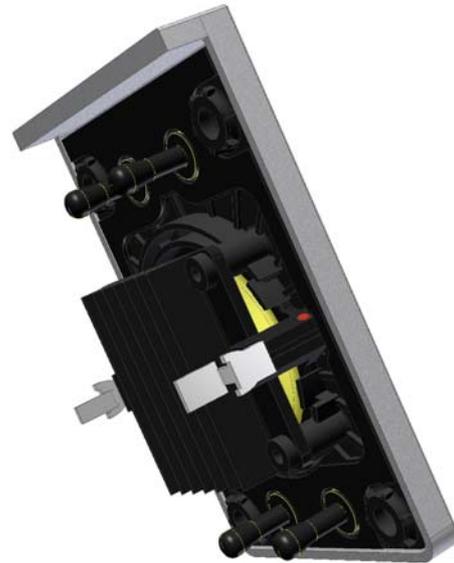


Figure 3, Rear view of 28mm neodymium tweeter for LEKTOR[®] 1.

The tweeters are mounted to the cabinet without visible screws, which eliminates diffraction and a minimalist and clean appearance.

Crossovers

The basic task of the crossovers in the LEKTOR[®] Series is to filter out frequency content not meant to be reproduced by the driver in question. The desired result is achieved by a unique combination of driver and crossover, for a seamless blend of the sound from two “neighboring” drivers. The crossovers are relatively simple in terms of the number of components (made possible by high quality, wideband driver design). Because of “simple” filtering/short signal path, it is possible to preserve as much of the original electrical signal as possible; preserving as much musical information as possible (contrary to doing heavy filtering or damage control of poor driver design, where a lot of energy is lost in the filter).

In the LEKTOR[®] Series, the unique combination of crossovers and drivers will form a very easy impedance load as seen from the amplifier. This will make the LEKTOR[®] speakers a very good partner even with amplifiers that have limited current capabilities. When the amplifier is gently loaded by the loudspeakers, it will perform better – and the end result is better sound because the signal from the amplifier to the loudspeakers is better.

All crossover components are of highly reliable audio grade quality. Unfortunately not always seen in this price range, all components are fastened with glue and cable ties to the circuit board for a highly stable mechanical construction. The component layout is optimized by ear to minimize component crosstalk. As an example, the inductors are individually positioned away from each other and their axes differ to avoid crosstalk between the electrical fields surrounding the inductors. The result is more clean and natural sound.

Binding Posts

To shorten the signal path, the crossover is mounted directly on the binding posts. The gold plated binding posts accept bare speaker cable ends as well as 4mm banana plugs. The surfaces of the binding posts are covered with transparent polymer which will prevent contact with conducting parts other than the speaker cables.

Cabinets

All the cabinets in the LEKTOR® Series are made of Medium Density Fiber board (MDF) for optimal strength and suppression of resonances in the cabinet structure. The rear part of the cabinet is wrapped with furniture grade laminate to give the speakers an exclusive visual appearance. The baffles are made of thick MDF-board with CNC-milled cutouts for drivers, bass reflex ports and snap locks for the grilles. The baffles are sanded, primed and coated with an ultra matt dark gray lacquer to ensure a long lasting attractive visual appearance.

All LEKTOR® speakers are bass reflex designs. In our experience a well designed bass reflex design has a more musical way of reproducing music than other design principles. Normally the bass reflex design principle is used to lower the cutoff frequency – this is done by adding the sound output from the bass reflex port with the output from the woofer. In the LEKTOR® speakers (and all other DALI bass reflex designs), the objective of adding bass reflex ports is to add a subtle bass output from the bass reflex ports and be able to thoroughly phase align the bass output with the rest of the speaker output - the latter is what matters the most. By designing the bass reflex port so that the response is phase aligned, integrity way up in the mid frequencies will be coherent and natural. Also the soundstage will significantly improve by tuning the bass reflex ports for optimum timing (and not maximum output).

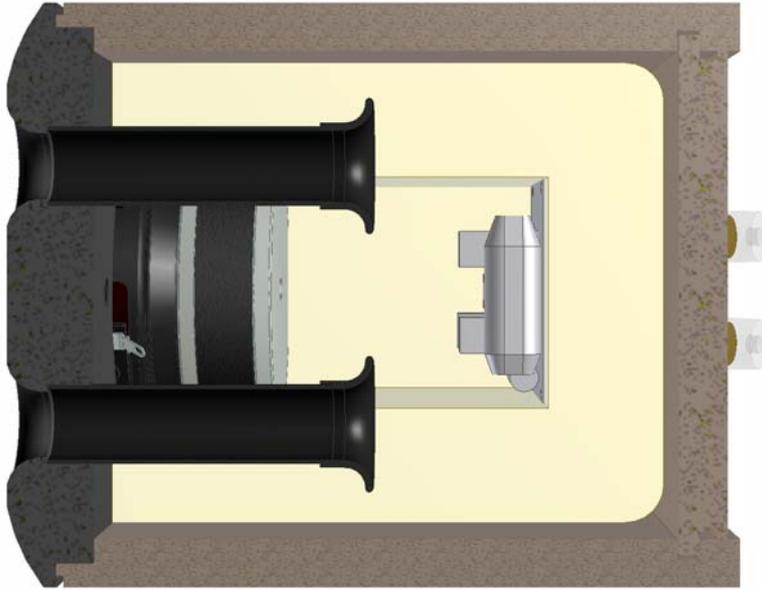


Figure 4, Half section view of LEKTOR[®] 1, notice the flared bass reflex ports, which will lower air speed in the ports. Consequently port turbulence is reduced.

All bass reflex ports are positioned on the baffle (except for LEKTOR[®] 8), meaning that the speakers can be positioned very close to the wall without compromising the bass reflex output.

The floor standing LEKTOR[®] 6 and 8 both come with both spikes (with M8 metric thread) and rubber feet, which can be mounted to the build-in machined inserts underneath the speakers.

The compact models come with rubber feet, which can be mounted underneath the speaker or on the rear edge of the speakers, if wall mounting is desired.

LEKTOR[®] 1, 2, 3 and LCR are suitable for positioning in/on a shelf or on-wall. They all come with integrated wall mounting bracket(s) for easy mounting of the speaker. Additionally LEKTOR[®] 2 and 3 can be positioned on a stand.

Grilles

The grilles for the LEKTOR[®] speakers are designed to minimize edge diffraction and reflections. This is done by minimizing reflective surfaces on the grilles. The grilles are thereby optimized to compromise the sound as little as possible.

The grilles are mounted with precision machined standoffs that are fixed in decorative aluminum snap locks on the edge of the baffle.



Figure 5, Decorative aluminum snap locks for mounting the grilles.

LEKTOR® Series Models

As stated in the introduction, the speakers in the LEKTOR® series are very versatile. The speakers perform well both for stereo and multi channel setups. In the following the applications of the different models will be exploited.

LEKTOR® 8

LEKTOR® 8 is the top model in the LEKTOR® Series. It is very suitable for a competent stereo setup or as main speakers in a large multi channel sound system. Due to the size of the speaker, it is most suitable for medium or large sized rooms. LEKTOR® 8 is capable of reproducing very low frequencies with convincing attack, dynamics and plenty of headroom. Due to a dedicated midrange driver, the sound is more clear and crisp.

Features:

- 2 x 8" woofers with wood fiber cones and low loss rubber surrounds
- 5" midrange with wood fiber cones and low loss rubber surrounds
- 28mm ultra light weight dome tweeter with aluminum faceplate
- 3-way design
- Audio grade crossover components
- MDF cabinet with furniture laminate finish/painted baffle
- Bass reflex ports on the front and rear
- Single wiring gold plated binding posts for bare wire ends and 4mm banana plugs
- M8 spikes and rubber feet included

LEKTOR® 6

LEKTOR® 6 is a larger all round speaker. The LEKTOR® 6 capabilities are basically the same as LEKTOR® 8, but LEKTOR® 6 is more suitable if the listening room is medium to small or if the speaker budget is an issue. LEKTOR® 6 is able to reproduce sound very entertaining - low frequencies with warmth and precision and the highs with great precision and soundstage.

Features:

- 2 x 6½" midrange/woofers with wood fiber cones and low loss surrounds
- 28mm light weight dome tweeter with aluminum faceplate
- 2½-way design
- Audio grade crossover components
- MDF cabinet with furniture laminate finish/painted baffle
- Bass reflex ports on the front
- Single wiring gold plated binding posts for bare wire ends and 4mm banana plugs
- M8 spikes and rubber feet included

LEKTOR® 3

The top model of the compact speakers in the LEKTOR® Series is LEKTOR® 3. It features a 6½" woofer/midrange, which is able to move plenty of air, and thereby reproduce a large amount of bass. LEKTOR® 3 is suitable in a stereo setup or a multi channel setup. In the latter, it works fine as large rear channels or even main speakers in a compact multi channel setup.

When positioned on a stand at ear height, performance will be great and there are plenty of opportunities to find an optimum positioning of the speaker. Positioned on-wall the bass foundation will be supported more than when positioned on a stand. Optionally LEKTOR® 3 can be positioned on/in a shelf.

When used as rear channels, the speaker will work fine in small to large rooms. When used in a stereo setup or as main speakers in a multi channel setup, small to medium sized rooms are preferred.

If higher sound pressures than is typical are desired, a good supplement to LEKTOR® 3 is adding a subwoofer – LEKTOR® SUB.

Features:

- 6½" midrange/woofer with wood fiber cone and low loss surround
- 28mm light weight dome tweeter with aluminum faceplate
- 2-way design
- Audio grade crossover components
- MDF cabinet with furniture laminate finish/painted baffle
- Bass reflex ports on the front
- Single wiring gold plated binding posts for bare wire ends and 4mm banana plugs
- Integrated wall bracket on the rear for on-wall mounting
- Rubber feet included

LEKTOR® 2

The woofer size in LEKTOR® 2 is 5" to achieve a compact form factor of the speaker making it very easy to discreetly position it in normal living rooms. Considering the

5" woofer size, the bass it can reproduce is incredible – the boundaries for what is possible have really been pushed. When using LEKTOR® 2 it is still possible to get a huge soundstage, rich sound with a lot of details.

Typical applications are the same as LEKTOR® 3, but with more focus on shelf/on-wall positioning instead of mounting them on a stand. LEKTOR® 3 might also be used as a compact upright positioned center channel speaker.

When used as rear channels, the speaker will work fine in small to large rooms.

When used in a stereo setup or as main speakers in a multi channel setup, small to medium sized rooms are preferred.

If higher sound pressures than is typical are desired, a good supplement to LEKTOR® 2 is adding a subwoofer – LEKTOR® SUB.

Features:

- 5" midrange/woofer with wood fiber cone and low loss surround
- 28mm light weight dome tweeter with aluminum faceplate
- 2-way design
- Audio grade crossover components
- MDF cabinet with furniture laminate finish/painted baffle
- Bass reflex ports on the front
- Single wiring gold plated binding posts for bare wire ends and 4mm banana plugs
- Integrated wall bracket on the rear for on-wall mounting
- Rubber feet included

LEKTOR® 1

Speaking about a relatively small woofer diameter for LEKTOR® 2, the 4½" woofer in LEKTOR® 1 is even smaller. But again, this very compact loudspeaker will surprise many listeners with how much sound and how large a soundstage that it is possible to reproduce in such a compact form factor.

Typical applications are the same as LEKTOR® 2, but in an even more compact form factor. LEKTOR® 1 might also be used as a compact upright positioned center channel speaker.

When used as rear channels, the speaker will work fine in small to large rooms.

When used in a stereo setup or as main speakers in a multi channel setup, small to medium sized rooms are preferred.

If higher sound pressures than is typical are desired, a good supplement to LEKTOR® 2 is adding a subwoofer – LEKTOR® SUB.

Features:

- 4½" midrange/woofer with wood fiber cone and low loss surround
- 28mm light weight dome tweeter with aluminum faceplate

- 2-way design
- Audio grade crossover components
- MDF cabinet with furniture laminate finish/painted baffle
- Bass reflex ports on the front
- Single wiring gold plated binding posts for bare wire ends and 4mm banana plugs
- Integrated wall bracket on the rear for on-wall mounting
- Rubber feet included

LEKTOR® LCR

LEKTOR® LCR is one of the most versatile loudspeakers in the LEKTOR® Series – it works as Left, Center and Right channel. It is equally suitable for stereo or multi channel setups – and it is obvious as center channel. In comparison with LEKTOR® 2, LEKTOR® LCR has a more bass foundation and headroom. Since there are two woofers, the sensitivity and power handling are higher.

When used as rear channels, the speaker will work fine in small to large rooms. When used in a stereo setup or as main speakers in a multi channel setup, small to medium sized rooms are preferred.

If higher sound pressures than is typical are desired, a good supplement to LEKTOR® 2 is adding a subwoofer – LEKTOR® SUB.

Features:

- 2 x 5" midrange/woofers with wood fiber cones and low loss surrounds
- 28mm light weight dome tweeter with aluminum faceplate
- 2-way design
- Audio grade crossover components
- MDF cabinet with furniture laminate finish/painted baffle
- Bass reflex ports on the front
- Single wiring gold plated binding posts for bare wire ends and 4mm banana plugs
- Integrated wall bracket on the rear for on-wall mounting
- Rubber feet included

LEKTOR® SUB

LEKTOR® SUB is the obvious companion for smaller speakers where high sound pressures and a large sound stage are desired in a compact setup. The subwoofer works equally well in stereo or multi channel setups.

LEKTOR® SUB will have great impact in medium to small rooms. If it is to be used in very large rooms, it can be desirable to use two subwoofers.

Features:

- 10" long stroke woofer with fiber cone
- 180W class A/B amplifier with integrated crossover
- Adjustment of: level, crossover frequency, phase
- Auto power/standby
- MDF cabinet with furniture laminate finish/painted baffle
- Bass reflex port on the bottom
- Stable positioning on rubber feet

Amplifier Selection

The LEKTOR® speakers are generally an easy load for an amplifier, because they are designed to be what we call amplifier friendly. The speakers work well with modest and entry level hi-fi amplifiers and they are designed and tested with great result with a wide selection of amplifiers from the market. However, to exploit the full capabilities of the LEKTOR® speakers, better amplifiers will increase the sound quality.

Cable Selection

Use good dedicated speaker cables for the speaker. Avoid using thin standard wire as it will compromise the sound. The longer the cable, the thicker it needs to be for optimum performance.

Packaging

All LEKTOR® speakers come in cardboard packaging with styrofoam for maximum protection during transport. The serial number of each pair of speakers is matched and the speakers in a pair should therefore always follow each other. The number of speakers per box is showed in the table below.

	LEKTOR®						
Model	8	6	3	2	1	LCR	SUB
Number of speakers/package	1	1	1	2	2	1	1

Technical Specifications

	LEKTOR® 1	LEKTOR® 2	LEKTOR® 3	LEKTOR® 6	LEKTOR® 8	LEKTOR® LCR	LEKTOR® SUB
Frequency range +/- 3 dB [Hz]	51 - 27000	49 - 27000	48 - 27000	47 - 27000	45 - 27000	52 - 27000	31 - 180
Sensitivity (2.83V/1m) [dB]	84,0	86,0	88,0	90,5	89,0	87,5	-
Nominal impedance [ohms]	8	6	6	6	6	8	20k
Maximum SPL [dB]	104	106	108	110	112	109	110
Recommended amp. power [Watts]	40 - 100	25 - 100	25 - 120	30-150	40-180	25 - 120	-
Crossover frequencies [Hz]	2900	2700	2800	1800/2900	600/3500	3200	300
Crossover principle	2-way	2-way	2-way	2½-way	3-way	2-way	180
Soft dome tweeter [mm]	1 x 28	1 x 28	1 x 28	1 x 28	1 x 28	1 x 28	-
Midrange driver [inch]	-	-	-	-	1 x 5	-	-
Low frequency driver(s) [inch]	1 x 4½	1 x 5	1 x 6½	2 x 6½	2 x 8	2 x 5	1 x 10
Enclosure type	Bass reflex	Bass reflex	Bass reflex	Bass reflex	Bass reflex	Bass reflex	Bass reflex
Bass reflex tuning frequency [Hz]	56,0	50,0	47,5	47,5	36,0	45,5	34,5
Connection input(s)	Single wire	Single wire	Single wire	Single wire	Single wire	Single wire	RCA
Recommended placement	Wall/shelf/ (stand)	Wall/shelf/ (stand)	(Wall/shelf)/ stand	Floor	Floor	Wall/shelf/abov e/below screen	Floor
Magnetic Shielding	No	No	No	No	No	No	No
Dimensions (H x W x D) [mm]	260 x 146 x 211	310 x 176 x 221	387 x 200 x 255	929 x 207 x 285	1059 x 251 x 370	600 x 172 x 175	355 x 310 x 395
Dimensions (H x W x D) [inches]	10.2 x 5.7 x 8.3	12.2 x 6.9 x 8.7	15.2 x 7.9 x 10.0	36.6 x 8.1 x 11.2	41.7 x 9.9 x 14.6	23.6 x 6.8 x 6.9	14.0 x 12.2 x 15.5
Accessories	Manual, rubber bumpers, wall bracket included	Manual, rubber bumpers, wall bracket included	Manual, rubber bumpers, wall bracket included	Manual, rubber bumpers, M8 spikes	Manual, rubber bumpers, M8 spikes	Manual, rubber bumpers, wall brackets included	Manual, rubber feet included
Weight [kg/lb]	3,1/6,8	4,1/9,0	6,4/14,1	14,2/31,3	24,2/53,4	7,0/15,4	14,5/32,0
Finishes	Vinyl/Light walnut, black	Vinyl/Light walnut, black	Vinyl/Light walnut, black	Vinyl/Light walnut, black	Vinyl/Light walnut, black	Vinyl/Light walnut, black	Vinyl/Light walnut, black

All technical specifications are subject to change without notice.

Please see the DALI website at www.dali.dk or visit your authorized DALI dealer for more information and a personal demonstration of the LEKTOR® Series.

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