

Opus<sup>2</sup>  
Loudspeakers



*Wharfedale*



# INTRODUCTION

The Opus<sup>2</sup> loudspeaker system is a premium quality, large format loudspeaker designed for exceptional accuracy in the reproduction of recorded music and film.

The scale of presentation and dynamic range is beyond that possible from conventional high-fidelity loudspeakers, primarily because of the volume of air capable of being displaced from the drive units; their speed of response and agility under pressure.

Numerous new technologies have been applied throughout the range to ensure that Opus<sup>2</sup> is capable of creating a lifelike listening experience akin to that of a live concert hall.

New Carbon-Fibre bass drivers, our unique tri-laminate cone, three-inch dome mid-range and a lightweight 'copper-coated' aluminium tweeter

voice-coil for extended and precise high-frequency response, all contribute towards one of the finest loudspeakers available today.

Build and finish is nothing short of exceptional - something you would expect from a product of this quality - yet every detail has been addressed.

The Opus<sup>2</sup> series fit effortlessly into the living environment with the choice of piano or satin finishes, and a range of real wood veneers - not reconstituted woods used on lesser loudspeakers. Gold-plated terminals, cast alloy trim and accessories simply guild the real construction which utilises variable-density multi-layer laminate MDF cabinets, sealed and isolated mid-range compartment, high-purity oxygen-free copper cables and a simple yet perfectly executed crossover.



## DESIGN TECHNOLOGY

The Wharfedale design principle has, since our foundation in 1932, been one of simple execution and vertical component synergy. This principle is manifest within Opus<sup>2</sup>. Every component, sub-assembly, even the crossover elements are manufactured entirely in-house to a standard commensurate with the product and with regard to every other component within the loudspeaker.

Through this vertical integration we are able to ensure the cabinets fit the drive units, that the operating spectrum of the drive units work with each other and that the whole is much greater than the sum of the parts - perfect synergy.

This all-embracing approach to design pays dividends in performance. Because the crossover can be

relatively simple, phase linearity is preserved, meaning the drive units move in unison - a seamless transition from one to the other without disconnect or interference.

Because each drive unit is operating so comfortably within its own specification, the presentation is relaxed and confident; powerful and fulfilling.

Opus<sup>2</sup> loudspeakers have a further feature - usually found only in the highest quality professional recording studios - a dome mid-range driver capable of reproducing the entire range of human vocal reproduction - with a dispersion characteristic which mimics the voice.

Through this synergy, Opus<sup>2</sup> achieves one of the most natural presentations possible from a moving-coil loudspeaker.





## APPLICATIONS

The most common criticism levelled at hi-fi companies today is that systems are designed either for home cinema use, or to reproduce stereo music accurately. It is seemingly difficult to find a system that combines the best of both worlds without compromise to each other. Opus<sup>2</sup>, however, has been engineered as a complete range with dedicated models available for use as centre channels and surround speakers.

Within film soundtracks, around 70% of the audio is usually directed through the centre speaker. It is essential therefore, that this speaker is not only of the very highest quality, but that it integrates seamlessly with the front left and front right speakers, presenting a cohesive front soundstage.

The Opus<sup>2</sup> centre channel speaker utilises the same dome mid-range and tweeter arrangement as in all the floorstand and stand-mount models.

Aligned vertically, their dispersion is uniform on the horizontal plane with none of the 'lobing' that lesser centre channels can be prone to.

Tonally matched and perfectly balanced to present vocals in a breath-takingly natural fashion, the Opus<sup>2</sup> centre is the result of many years work in the field of home cinema.

The tri-surround speakers within the Opus<sup>2</sup> range take the principle of tonal matching further still, perfectly integrated with the rest of the series, yet with a full 180 degree dispersion aimed at fully immersing the listener within a complete soundfield.

The Opus<sup>2</sup> series also includes the new 'AVC' models. These are specifically engineered to be wall mounted for the least intrusive installation, yet with the same outstanding neutrality and cleanliness as the larger models.



## INTEGRATED DRIVER DESIGN

A new studio monitor quality large dome mid-range drive unit is used over the crucial midband frequencies, 700 Hz – 4 kHz. A key feature of this driver is exceptionally low distortion over its entire working range – typically less than 1% at a Sound Pressure Level of 100 db at 1 metre. The driver is mounted in a custom matched fascia plate which provides



partial horn loading, giving a broad angle of dispersion at its upper crossover point. The fascia plate is die cast aluminium, designed to place the units as close as possible for optimum integration and to create a point source effect.

The dome is driven by a large 75 mm voice coil based on a hard aluminium former to provide maximum rigidity and to maintain a cool coil operating temperature by maximising thermal radiation. The diaphragm supporting ring is die cast aluminium to maintain perfect concentricity of the moving parts during assembly. The dome is pressure equalised by a closely coupled underside perforated dome baffle and a rear chamber within an extended die cast aluminium finned

rear cover which serves as a heat sink and breaks up internal resonances. A powerful high flux shielded magnet provides ample reserves of motor force to the dome.

The highest frequencies are handled by a soft dome driver.



Extensive research at Wharfedale has established that properly engineered soft domes are a better choice than metallic based domes, which add their own typical character to the treble response. The new Opus<sup>2</sup> tweeter has been re-engineered with a fine gauge aluminium coil to reduce the moving mass and extend response to beyond 45 kHz -far above audible frequencies.

Careful attention to detail has resulted in wide dispersion with very low distortion again typically below 1% at an SPL of 100 db at 1 metre. The unit uses a fully shielded high flux neodymium magnet, and produces a typical SPL of 93 dB at 1 metre at an input of one Watt. Die cast aluminium structural parts are used throughout and a rear cover isolates the tweeter dome from the pressure of other speaker components.





# PERFORMANCE BASS

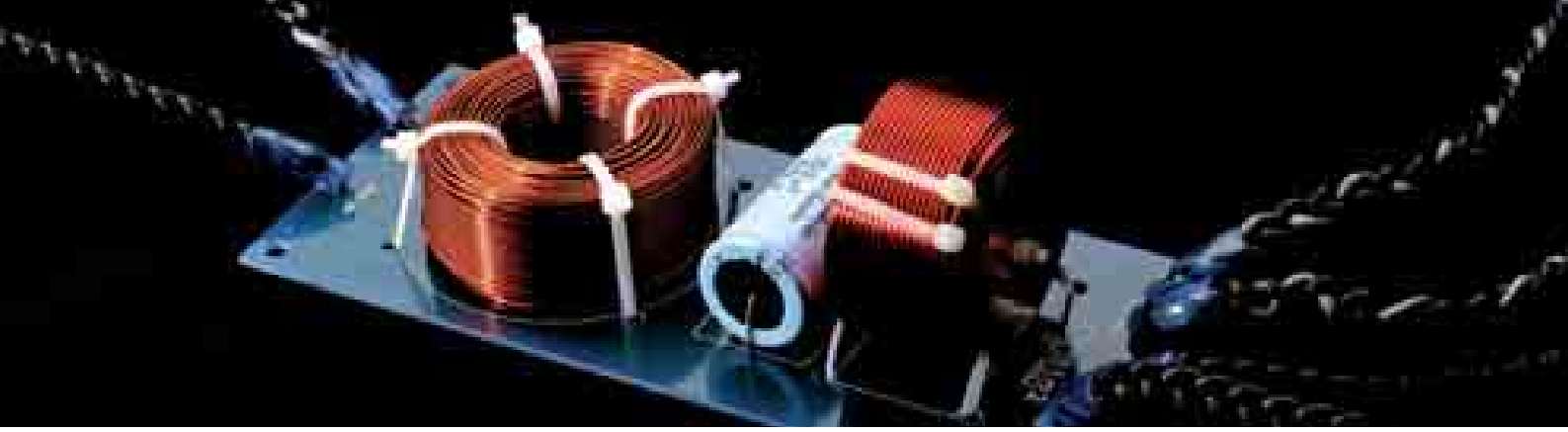
Opus<sup>2</sup> bass units are of two main types. The smallest cabinets use a triple laminated cone of glass /carbon/ glass. Smaller cabinets intensify reflections that can pass back through the cone. The special "tri-lam" construction minimises these reflections because of its extreme rigidity. The larger cabinets use larger drivers and here low cone mass is of crucial importance in maintaining impulse response and performance.

Our latest cone designs for the large format models utilise our own bi-carbon weave and laminating processes. Carbon fibre has immense longitudinal strength and is used in many structures where high strength and light weight are key requisites. The carbon fibre bundles are woven and impregnated with special bonding resins that are subsequently pressure formed and heat cured. The resulting material is exceptionally rigid and exhibits very low levels of internal resonance. As a consequence, energy losses in the cone transfer mechanism are very low. Because our bass drivers are just that, their cones maintain true piston action over their entire designed low frequency range. The cone is terminated with a large half roll of synthetic butyl rubber with superb damping qualities.

Voice coils in high performance loudspeakers have to withstand extremes of mechanical stress and heat. The lateral strength of Opus<sup>2</sup> voice coils is very high. We use a combination of half hard aluminium and resin bonded glass fibre. The ability of our voice coils to resist deformation under extreme stress contributes towards some of the lowest distortion figures ever seen in conventional drivers.

All Opus<sup>2</sup> large format speakers are fully magnetically shielded with additional bucking magnets and steel covers on the bass driver magnets. You can operate an Opus<sup>2</sup> speaker close to the most magnetically sensitive TV monitor with no fears over screen interference. In some loudspeakers, motional noise can be a problem especially in high output bass systems. The Opus<sup>2</sup>'s high pressure injection die-cast aluminium chassis used on our bass drivers feature an 'open design' where narrow legs maximise the open areas of the frame to all but eliminate rear reflections. Trapped or compressed air within the driver unit can easily move through vents in the voice coil, through the magnet structure, through the spider, and from the underside of the central cap both through holes in the cone and the magnet central core.



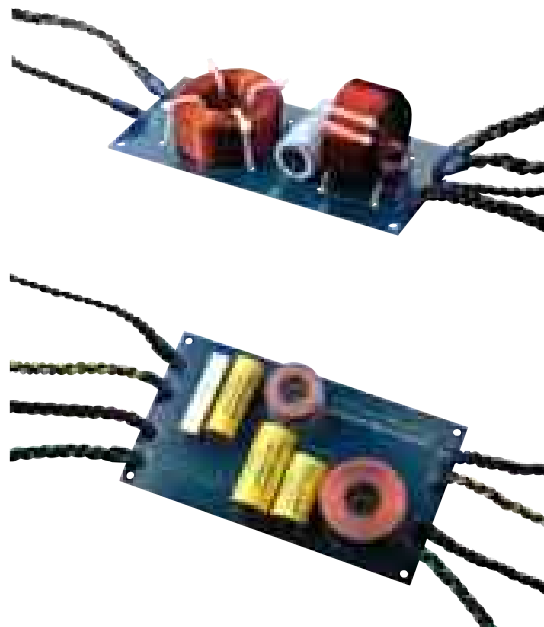


## A PERFECT BALANCE

All models feature printed circuit boards with large copper tracks to maximize signal transfer and component layouts designed to eliminate inference from any residual stray magnetic fields. The printed circuit boards are mounted on vibration free mountings. Most models have two printed circuit boards to separate the bass inductors from those coupling the midrange and tweeter units.

The bass inductor has a large magnetic field when operating which would otherwise modulate the other inductors. All inductors feature perfect layer winding and large gauges of wire are used to keep insertion loss to a minimum. Capacitors in crossover networks pose special problems. The Opus<sup>2</sup> range features high grade low-loss, low-ecr, polypropylene or reversible

electrolytic capacitors specially selected for their outstanding audio properties. These capacitors are marked with the 'Wharfedale super audio capacitor' logo. The internal cables used are specially made and assembled in our factory: 4 multiple strand oxygen-free copper wires are plaited into a single cable for all internal loudspeaker connections.







# MEASURED PERFORMANCE

It is often said that a loudspeaker is the weakest point in any audio system and this is largely true. It is the point at which the electrical signal is converted into compressions and rarefactions within the air that our ears recognise as sound.

The mechanics of this transfer of energy and how accurately this occurs is a constant battle for the loudspeaker engineer and one which we, at Wharfedale, have lead the field for over seventy-five years.

The measured performance of our Opus<sup>2</sup> system is a testament to this success. We have engineered a loudspeaker system that is ruler-flat across a wide band-width and yet remains a relatively easy load for any good amplifier system.

Many loudspeaker engineers aim for a sound that could be described as 'cosy'. It is easy to listen to for short

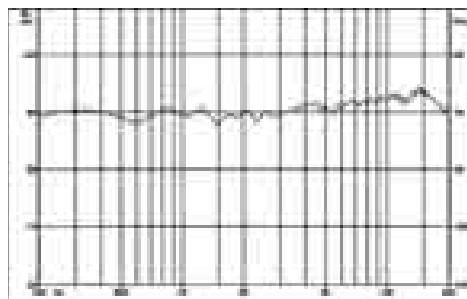
periods and immediately impressive in demonstration. Most notably though from the engineer's point of view, it hides many kinds of small frequency response anomalies. Aside from not reproducing the original recording faithfully though, this can be inclined to cause longer-term listening fatigue.

A cosy response is nowhere near as accurate, revealing, transparent or, in the long term, enjoyable as a well-balanced flat response.

Even small anomalies in the frequency response have a profound effect on the overall loudspeaker balance. Peaks in the response spectrum can mask surrounding frequencies leading to a loss of transparency and a 'blurring' of the soundstage. Because we engineer our own drive units and cabinets in complete synergy to the rest of the design process, we control every aspect of our drivers' performance and can get much closer to an ideal performance.



Opus<sup>2</sup> - 3: Frequency Response

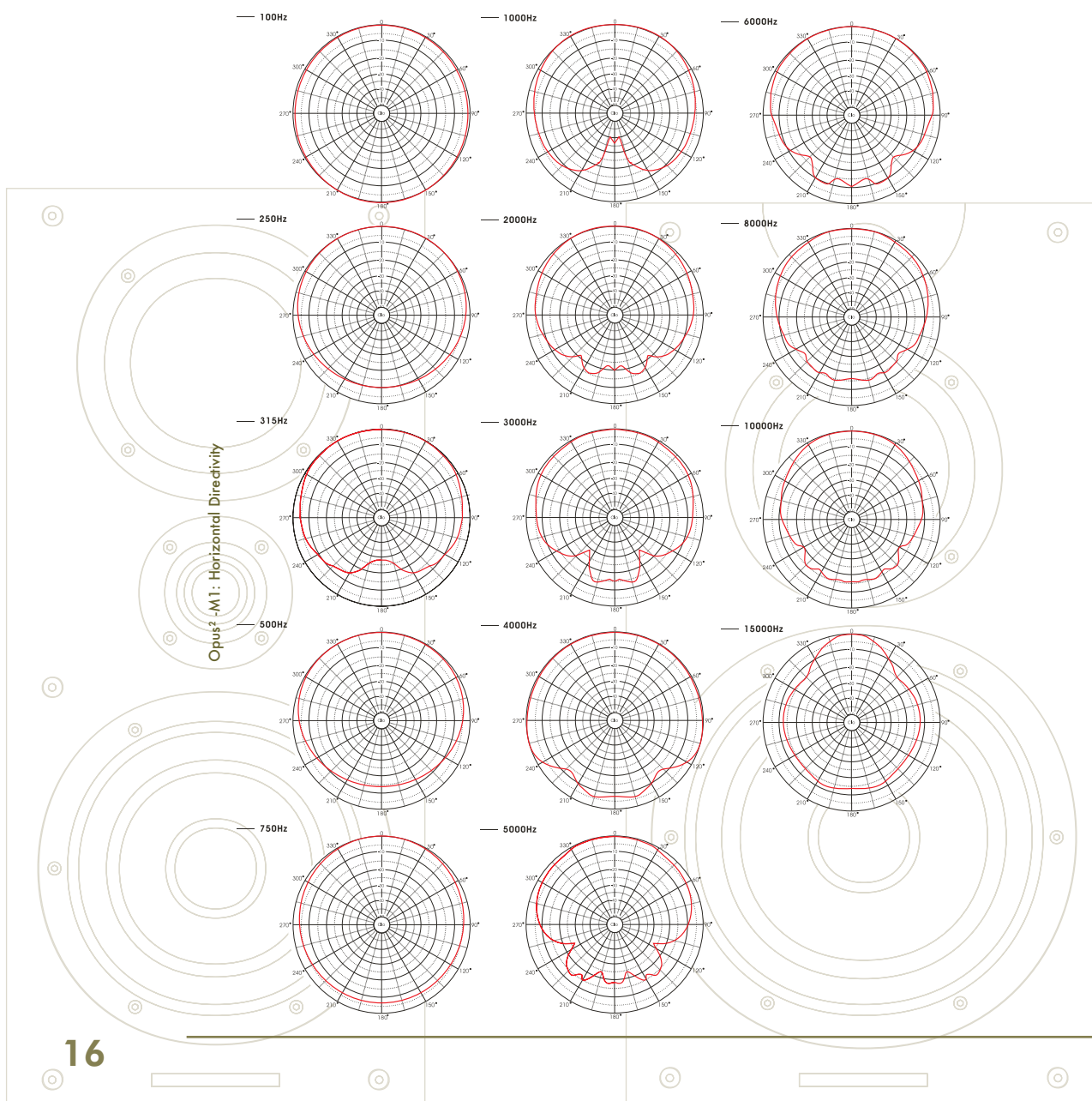


# MEASUREMENT AND ANALYSIS:

Frequency response plots may tell you a lot about what you might hear from a loudspeaker when you listen to a speaker 'on-axis' or straight in front of the speaker, but do nothing to tell you how a loudspeaker will integrate into a real room environment.

Anomalies in the off-axis response can cause reflections from side walls or room objects to create unpleasant interference effects

By analysing the 'Polar Response' across a wide range of frequencies, it's possible to design a loudspeaker which not only has a text-book 'on-axis' response, but one which can integrate superbly into the listening environment. Whilst this is important to the performance of a stereo speaker system, in multi-channel or home-cinema systems it is nothing short of essential - yet so many manufacturers overlook this key design stage.





## ENGINEERING PERFORMANCE

The overall measure of success of a high-end loudspeaker system is to design a loudspeaker that is both accurate and natural, very low in distortion, which covers a wide band-width of frequencies and can provide immense pleasure to the listener over long periods of time.

Many of these criteria can be designed into a system through careful measurement and analysis, but the final factor - the ability to provide pleasure to the listener is a black art - a skill developed by the master acoustician over a lifetime of experience.

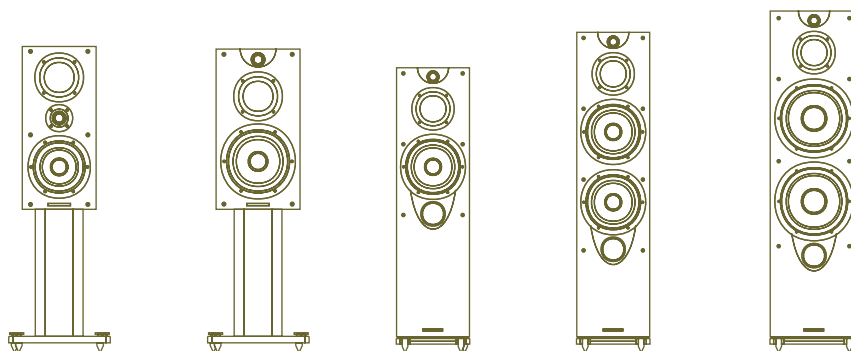
Opus<sup>2</sup> loudspeakers meet all the prerequisites of performance - in fact in measured tests, they outperform all their peers and many which cost considerably more. The final

arbiter though, the human ear, is the most important test of all - and all Opus<sup>2</sup> loudspeaker models have undergone a two-year long process of listening and tweaking before final approval to refine and further refine their balance to the point where the loudspeaker acoustically 'vanishes' - leaving just the music.

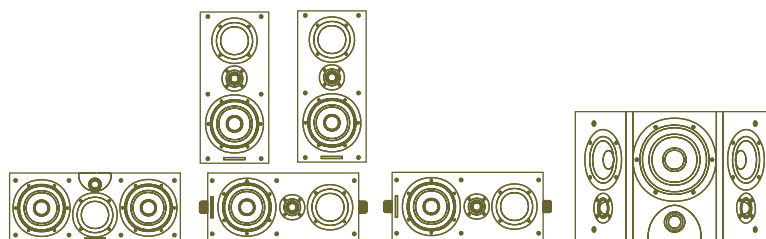
Only when a loudspeaker truly represents not only the tonal integrity and clarity of the original performance, but also is so finely balanced that it communicates the genuine passion and raw emotion of the live performance, can we be satisfied that all the design objectives have been fulfilled.

All Opus<sup>2</sup> loudspeakers meet these most stringent objectives.

# SPECIFICATIONS

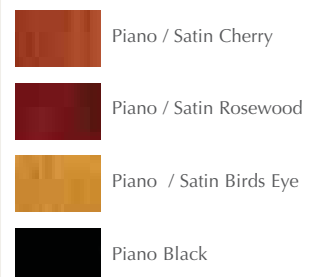


	Opus² - M1	Opus² - M2	Opus² - 1	Opus² - 2	Opus² - 3
<b>Transducer complement</b>	Three	Three	Three	Four	Four
Bass Driver Cone	170mm	200mm	200mm	200mm x 2	250mm x 2
Soft Dome Mid-range	3" 75mm textile	3" 75mm textile	3" 75mm textile	3" 75mm textile	3" 75mm textile
Soft Dome Tweeter	1" 25mm textile	1" 25mm textile	1" 25mm textile	1" 25mm textile	1" 25mm textile
Nominal impedance	6 Ohms	6 Ohms	6 Ohms	6 Ohms	6 Ohms
Impedance variation ohms	4.2 - 28	5.0 - 25	5.0 - 33	4.5 - 34	4.0 - 34
Frequency Response +/- 3dB	42Hz - 43kHz	40Hz - 43kHz	37Hz - 43kHz	35Hz - 43kHz	33Hz - 43kHz
LF limit -10 dB	38Hz	36Hz	28Hz	28Hz	27Hz
HF limit - 10 dB	45kHz	45kHz	45kHz	45kHz	45kHz
Rec.rear to wall off- set	300mm	200mm	300mm	100mm	400mm
SPL (1w @ 1m)	87dB	88dB	89dB	90dB	91dB
Distortion 20 - 600Hz 100dB @1m	<3%	<3%	<3%	<3%	<3%
600 - 50KHz	<1%	<1%	<1%	<1%	<1%
<b>Power Handling</b>					
Continuous Programme	75W	100W	150W	250W	300W
Recommended Amplifier Power	40 - 150W	50 - 200W	60 - 300W	100 - 500W	100 - 600W
Max Peak SPL	106dB	108dB	109dB	115dB	116dB
Horizontal Coverage (nom.)	90° to 14kHz	90° to 14kHz	90° to 14kHz	90° to 14kHz	90° to 14kHz
Vertical Coverage (nom.)	70° to 12kHz	70° to 12kHz	70° to 12kHz	70° to 12kHz	70° to 12kHz
Enclosure type: Bass/Mid	Ported	Ported	Ported / Sealed	Ported / Sealed	Ported / Sealed
Volume: Bass / Mid	18L / NA	27L / NA	33L / 10L	30 / 14L	51 / 22L
System Fb	40Hz	40Hz	35Hz	30Hz	30Hz
Crossover Frequencies	650Hz , 3kHz	700 Hz , 3kHz	650Hz , 3kHz	650Hz , 3kHz	650Hz , 3kHz
Construction Material	15 & 30mm MDF	18 & 33mm MDF	18 & 33mm MDF	18 & 33mm MDF	18 & 34mm MDF
Product Dimensions mm	510 X 230 X 360	505 X 255 X 450	1005 X 260 X 410	1140 X 260 X 410	1210 X 315 X 440
Nett Weight	12.0kg	16.4kg	28.0kg	34.5kg	40.0kg



	Opus² - Tri-Centre	Opus² - AvS	Opus² - AvC	Opus² - Tri-Surround
<b>Transducer complement</b>	Four	Three	Three	Five
Bass Driver Cone	170mm x 2	170mm	170mm	170mm
Soft Dome Mid-range	3" 75mm textile	3" 75mm textile	3" 75mm textile	3" 75 mm textile
Soft Dome Tweeter	1" 25mm textile	1" 25mm textile	1" 25mm textile	1" 25 mm textile
Nominal impedance	6 Ohms	6 Ohms	6 Ohms	6 Ohms
Impedance variation ohms	4.5 - 24	4.0 - 18	4.0 - 18	4.0 - 12
Frequency Response +/- 3dB	75Hz - 43kHz	45Hz - 43kHz	45Hz - 43kHz	60hz - 43kHz
LF limit -10 dB	70Hz	40Hz	40Hz	50hz
HF limit - 10 dB	45kHz	45kHz	45kHz	45Hz
Rec.rear to wall off-set	100 - 400mm	0mm	0 m	100mm
SPL (1w @ 1m)	89dB	88dB	88dB	89dB
Distortion 20 - 600Hz 100dB @1m	20-200 <5%	<3%	<3%	<3%
600 - 50KHz	200-45k <1%	<1%	<1%	<1%
<b>Power Handling</b>				
Continuous Programme	200W	100W	100W	100W
Recommended Amplifier Power	70 - 400W	40 - 200W	40 - 200W	40 - 200W
Max Peak SPL	113dB	108dB	108dB	110dB
Horizontal Coverage (nom.)	80° to 12kHz	90° to 14kHz	90° to 14kHz	180° to 10kHz
Vertical Coverage (nom.)	30° to 12kHz	70° to 14kHz	70° to 14kHz	90° to 12 Hz
Enclosure type: Bass/Mid	sealed	sealed	ported	Ported / Sealed
Volume: Bass / Mid	25L / NA	9L / NA	12L / NA	30 / 14L
System Fb	60Hz	70Hz	60Hz	30HZ
Crossover Frequencies	900Hz, 4kHz	700Hz, 4kHz	700 Hz, 3.5 kHz	650 Hz , 3 kHz
Construction Material	15 & 25mm MDF	15 & 25mm MDF	15mm MDF	18 & 33mm MDF
Product Dimensions mm	242 X 575 X 320	500 X 230 X 140	230 X 500 X 140	280 X 460 X 180
Nett Weight	14.7kg	9.0kg	9.0kg	10.6kg

#### Finishes (all models)



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