

DATASHEET

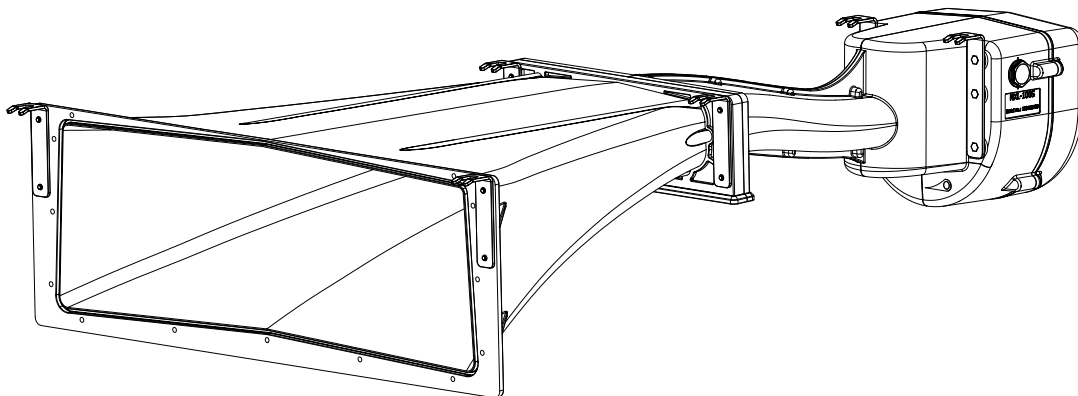
Product	NXL-100S-RH	Part numbers	0200202, 0200204 and 0200206
Document version	1.3	Document status	Release
Notes	Reduced Height (RH) product variant 0200202 = Standard with cable gland on left side (front view) 0200204 = Optional Hirschmann CA 3 GD on left side (front view) 0200206 = Optional Hirschmann CA 3 GD on right side (front view)		

PRODUCT DESCRIPTION

The NXL-100S-RH is a high-power 100 V horn loudspeaker with exceptional features. Its high SPL capability, good directivity properties, reliable design and extremely low-profile mounting make it a perfect fit for cost-effective applications in Voice Evacuation systems implemented in Traffic Tunnels with limited free space.

The NXL-100S-RH incorporates unprecedented protection features that are based on integrated novel real-time diaphragm excursion monitoring and voice coil temperature measurement circuitry. The related smart internal electronics is self-powered from the 100 V audio input and is only activated for higher input levels. Of course the NXL-100S-RH also offers the more common features such as High Pass Filter, ceramic terminal block, tap selection, internal thermal and self-resettable overcurrent fuses. A mechanical provision to ensure safety in case of exposure to extreme heat is included as well. Enhanced serviceability is provided by the internal subframe and replaceable ingress protection cartridge.

The NXL-100S-RH is easy to install due to its low weight and moderate dimensions, convenient rear cover retention strap and mounting brackets design. The device complies with the highest flammability rating (IEC 60695-11-20/UL 94 class 5VB, that outperforms class V0), offers the required ingress protection (IP 66) and is insensitive to the rough environmental conditions typically encountered in Traffic Tunnels.



FEATURES

<p>Optimized Waveguide</p>	<p>The BEM-optimized asymmetrical waveguide is based on a novel approach. The waveguide is optimized for tight positioning on a reflective boundary plane while avoiding a neck shaped transition with sharp bends. Flare discontinuities are minimized resulting in a reduction of higher order modes and consequently a better controlled wavefront and improved directivity with negligible off-axis lobing. This design yields low structural losses and good directivity properties; a high and nearly constant Directivity Index for frequencies above ~ 1.2 kHz, reduced mouth diffraction, less vertical HF interference effects and a smooth off-axis behavior. This allows for a larger distance (> 50 m, depending on acoustical conditions) between devices in a typical delay-aligned set-up. Note that the default product variant (NXL-100S) offers improved directivity properties compared to the reduced height variant (NXL-100S-RH).</p>
<p>Sturdy Compression Driver</p>	<p>The NXL-100S-RH is built around a custom developed high-power compression driver with 4" CCAR voice coil, featuring high reliability and high excursion capability yet good HF response. A special surround and lead wires design significantly reduces the chance of mechanical fatigue-related failures. A reliable electrical connection with the protection circuit board is ensured by the application of screw terminals instead of spring-loaded binding posts.</p>
<p>Smart Electronics</p>	<p>Smart microcontroller-based electronics handles the internal protection and status monitoring. The electronics module is self-powered from the 100 V audio input and is only activated in case of sufficient input level. Linearity and very low power consumption are guaranteed by the multi-regulator and multi-buffer design of the internal power supplies. Extremely short boot time ensures a fast response to thermal and mechanical overload conditions.</p>
<p>Diaphragm Excursion Monitoring</p>	<p>A custom developed integrated sensor accurately measures the compression driver's diaphragm displacement in real-time. This novel approach does not derive the displacement from measured voice coil current/voltage and consequently does not depend on a priori knowledge concerning driver parameters and acoustical loading. The measuring method is robust, contactless and insensitive to environmental conditions.</p>

Voice Coil Temperature Monitoring	<p>The temperature of the voice coil is monitored in real-time during operation to ensure safe thermal operating conditions under all circumstances.</p>
Extensive Protection	<p>Diaphragm over-excursion is prevented by an internal filter that is controlled by the measured excursion. Thermal overload is prevented by momentarily reducing the secondary voltage based on the measured voice coil temperature. Both mechanisms effectively protect against damage due to incorrect system configuration. Protection will typically not be activated during normal operation of a properly dimensioned and configured system.</p> <p>The smart protection scheme is complemented by a thermal fuse, as well as a self-resettable fuse that effectively protects against abuse.</p>
Protection Status	<p>A high-efficiency RGB LED provides a visual indication of the smart protection status during system commissioning. The protection status can also be monitored remotely by means of external load monitoring.</p>
Load / EOL Monitoring	<p>The NXL-100S-RH supports standard external load monitoring schemes (HF pilot tone based).</p> <p>BOSCH PRAESENSA PRA-EOL end-of-line compatible functionality is included and can be enabled during installation by means of an internal jumper.</p>
Low Profile	<p>Tight boundary plane mounting in conjunction with an extremely limited device height ensures a maximum free space in Traffic Tunnel applications.</p>
High Flammability Rating	<p>The enclosure material complies with the highest flammability rating, IEC 60695-11-20 / UL 94 class 5VB as required by EN 54-24. The NXL-100S-RH outperforms products that are only class V0 compliant.</p>
Replaceable Ingress Protection	<p>A cartridge, using a stainless steel mesh with hydrophobic and dust repellent coating, offers good ingress protection and effective ferromagnetic dust collection.</p> <p>The mesh has a low acoustical insertion loss and is easy to clean or replace during maintenance.</p>

Taps & Connections	<p>100 W or 50 W tap is selectable by means of an internal wire jumper that can be set as required during installation. The 100 V feed is terminated into a screw terminal block with engineering ceramic body and nickel-plated brass inserts.</p>
Subframe	<p>The compression driver, step-down transformer and electronics are mounted on an internal AISI 316 stainless steel subframe. This solution enhances serviceability as the complete assembly can be easily exchanged after removal of the rear cover. The subframe also increases the thermal handling capacity of the compression driver. Furthermore, the subframe is mechanically secured to the boundary plane (ceiling) when the device is mounted using the supplied AISI 316 stainless steel brackets. This increases safety in case of exposure to extreme heat.</p>
Environmental Protection	<p>The rear enclosure is IP 66 compliant. An effective venting provision, that equalizes internal pressure and minimizes condensation, reduces stress on the rear cover seal. This enhances the long-term sealing ability.</p> <p>All external metal parts are stainless steel AISI 316, external fasteners are stainless steel A4.</p> <p>Compression driver steel parts are protected against oxidation by cathoporesis treatment.</p>
Modularity	<p>The modular enclosure significantly reduces shipping costs when assembled on site. All joints between enclosure modules are reliably sealed with durable gaskets that provide a low long-term compression set.</p>
Ease of installation	<p>Low weight, modest dimensions and slotted mounting brackets allow for one-person mounting.</p>
Design	<p>Industrial product with great looks, professional injection molded enclosure.</p>

TECHNICAL SPECIFICATIONS

ACOUSTICAL¹

Frequency Range ²		350 Hz to 12 kHz (+3 / -10 dB)
Sensitivity (1 W / 4 m) ^{3, 4, 5}	Half-space	107 dB _{SPL}
	Full-space	101 dB _{SPL}
Maximum SPL (100 W / 4 m) ^{3, 4, 6}	Half-space	125 dB _{SPL}
	Full-space	119 dB _{SPL}
Horizontal Opening Angle ⁷	250 Hz	117°
	500 Hz	62°
	1 kHz	33°
	2 kHz	28°
	4 kHz	28°
	8 kHz	25°
Vertical Opening Angle ⁸	250 Hz	68°
	500 Hz	40°
	1 kHz	21°
	2 kHz	13°
	4 kHz	12°
	8 kHz	16°
Directivity Index ⁹	1.2 kHz to 10 kHz	22.1 dB (+/- 1.5 dB)

ELECTRICAL

Rated Impedance ¹⁰	100 W tap	100 Ω
	50 W tap	200 Ω
Minimum Impedance ¹¹	100 W tap	>= 80 Ω
	50 W tap	>= 160 Ω
Average Impedance ¹²	100 W tap	150 Ω
	50 W tap	300 Ω
Rated Noise Power ¹⁰		100 W _{rms}
Rated Noise Voltage ¹⁰		100 V _{rms}
Filter	HPF	F _{-3dB} at 250 Hz
Fuses	Thermal	Activation Temperature 104 °C Current Rating >= 8 A at 250 V _{AC} One-shot (replaceable)
	Overcurrent	PPTC resettable fuse Trip current 1.25 A
Cable Gland (default) ¹³	Thread Size	PG 13.5 or M20
	Minimum Diameter	6 mm
	Maximum Diameter	12 mm

Connector (optional) ¹⁴	Type	Hirschmann CA 3 GD
	Pins	P1 (0 V) P2 (100 V) P3 and P4 (PE) are NC
Connections	Poles	100 V and 0 V
	Body Material	Engineering Ceramic
	Temperature Rating	500 °C maximum body temperature / 800 °C short-time
	Terminals ¹⁵	M3 screw terminals, nickel-plated brass
	Rated Cross-section	2.5 mm ²
	Maximum Conductor Cross-section	2.5 mm ² (stranded) / 4 mm ² (solid)
Tap Setting	Taps	100 W and 50 W
	Configuration ¹⁵	Internal Wire Jumper
Smart Protection	Minimum Primary Voltage	6 V _{rms}
	Power consumption	< 10 mW
Excursion Protection	Sensor	Contactless
	Control	Solid State Switchable Filter
	Threshold	600 µm peak
Thermal Protection	Threshold	180 °C voice coil temperature
	Control	Relay
	Gain Reduction	6 dB
Status Indication	Type	RGB high-efficiency LED
	Excursion Detection	Green (Pulse)
	Excursion Protection Active	Red (Flash)
	Thermal Protection Active	Blue (Flash)
	Flash Frequency	1 Hz
Transducer	Type	Compression Driver (1.5" exit)
	Voice Coil	4" diameter, CCAR wire
	Diaphragm	Titanium with HTR Polyimide Surround
	Polarity	Positive voltage on + moves diaphragm towards phase plug
	Terminals	2 x M4
Load Monitoring ^{3, 16}	Normal	Z = 170 Ω at 20 kHz
	Excursion Protection Active	Z = 135 Ω at 20 kHz
	Thermal Protection Active	Z = 340 Ω at 20 kHz
	Voice Coil Open	Z > 5 kΩ at 20 kHz
	Voice Coil Short	Z < 30 Ω at 20 kHz
EOL Monitoring	Scheme	BOSCH PRA-EOL compatible
	Configuration ¹⁵	Internal Jumper

MECHANICAL

Dimensions (L x W x H) ¹⁷	1119 x 650 x 231 mm	
Weight ¹⁸	12.0 kg	
Enclosure Protection ¹⁹	IP 66	
Enclosure Material	Flame-Retardant Thermoplastic	
Flammability ²⁰	IEC 60695-11-20/UL 94 class 5VB	
Color	Enclosure	Black
	Mounting Brackets	Metal
Mounting	Brackets (Stainless Steel AISI 316)	
Mounting Points ¹⁷	6 x bracket, 9 mm slit width	
Packaged Dimensions (L X W X H)	TBD mm	
Packaged Weight	TBD kg	

GENERAL

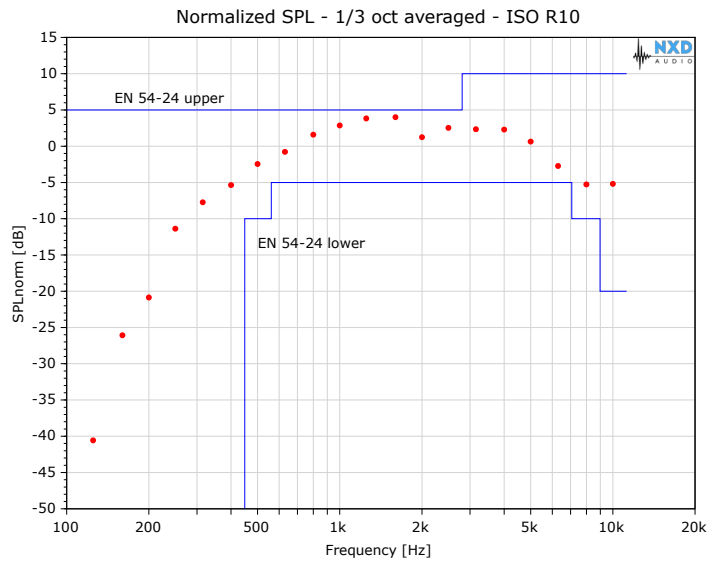
Temperature Range (ambient) ²¹	-25 to 70 °C
MTBF	TBD
Standards ²²	EN 54-24 Type A and B
Certificates	CE

NOTES

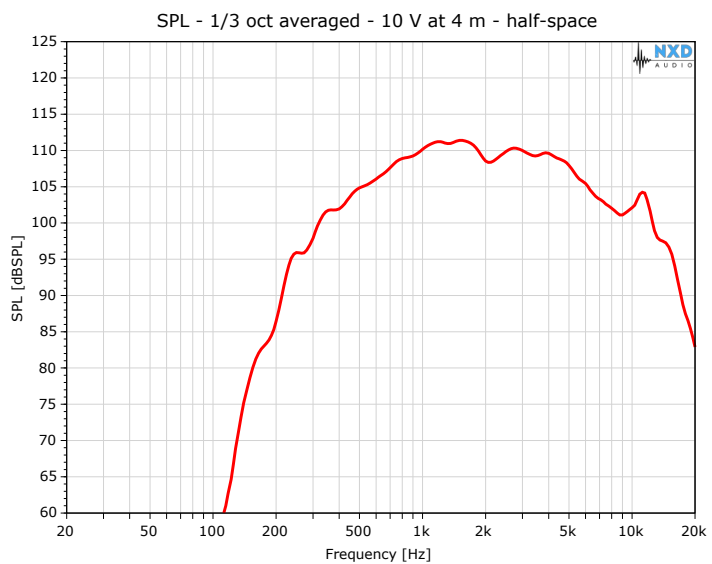
- 1 All specifications are valid under normal operating conditions and with disabled protection unless stated otherwise.
- 2 On reference axis at 4 m from reference point, see Physical References on p16, half-space, 1/3 octave averaged, see SPL plot on p8.
- 3 Valid for 100 W tap.
- 4 Half-space data as measured, full-space data is calculated as half-space data minus 6 dB.
- 5 Pink noise, SPL analyzed in ISO R10 bands (1/3 oct) from 100 Hz to 10 kHz according to EN 54-24:2008, see Normalized SPL plot on p8.
- 6 Simulated program signal according to IEC 60268-1:1985, 100 Vrms with a crest factor of 6 dB.
- 7 In the horizontal plane at 4 m from reference point, half-space, -6 dB, 1/1 octave averaged, see Horizontal polar plots on p12.
- 8 In the vertical plane at 4 m from reference point, half-space, -6 dB, 1/1 octave averaged, see Vertical polar plots on p13.
- 9 At 4 m from the reference point, half-space, 1/3 octave averaged, see DI plot on p10. The NXL-100S variant has higher DI values for LF.
- 10 According to EN 54-24:2008.
- 11 See Impedance plots on p8 and p9.
- 12 Linear average for impedance magnitude in ISO R10 bands (1/3 oct) from 100 Hz to 10 kHz.
- 13 The default product variant (part number 0200202) is equipped with a gland on the left side (front view).
- 14 For compatibility with older products, a Hirschmann CA 3 GD connector can be installed on left or right side in stead of the gland.
- 15 Accessible when rear cover removed, see Installation Manual.
- 16 PRA-EOL disabled.
- 17 See Mechanical section on p14 and next pages.
- 18 Including mounting brackets.
- 19 For rear enclosure only, according to IEC 60529: 1992 +C2: 2016. Product IP rating according to EN 54-24:2008 Type B.
- 20 Concerns enclosure material.
- 21 Maximum ambient temperature for continuous operation is 40 °C.
- 22 Product is designed to be compliant with this standard but not certified.

LOTS

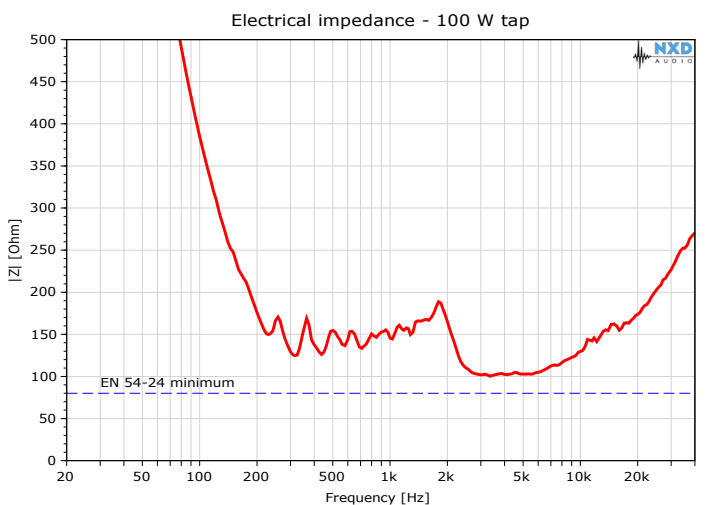
Normalized SPL vs frequency
 1/3 octave averaged
 ISO R10 frequencies
 4 m
 Half-space



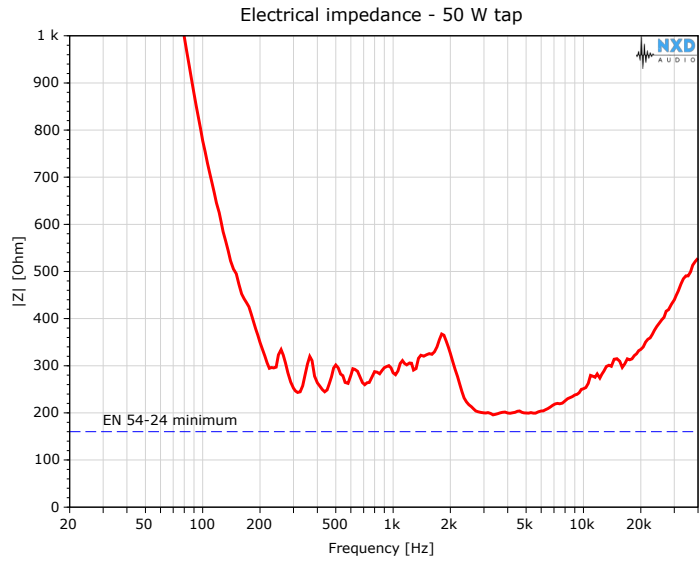
SPL vs frequency
 1/3 octave averaged
 10 V
 4 m
 Half-space



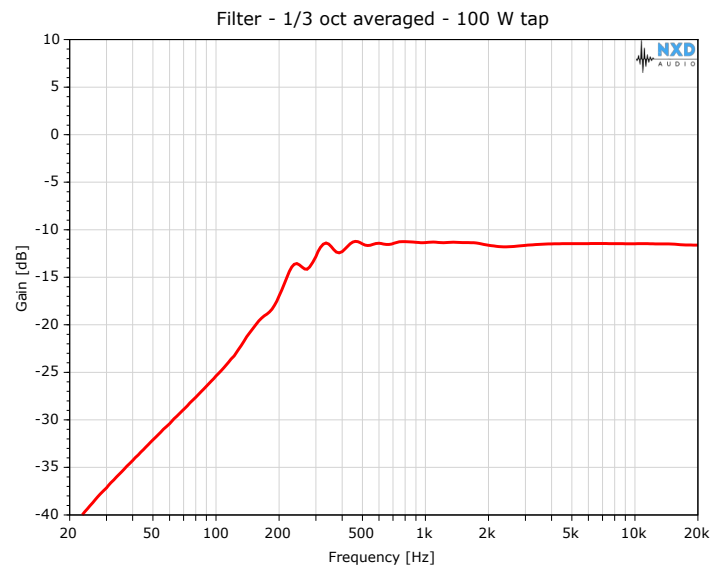
Impedance vs frequency
 100 W tap
 Half-space



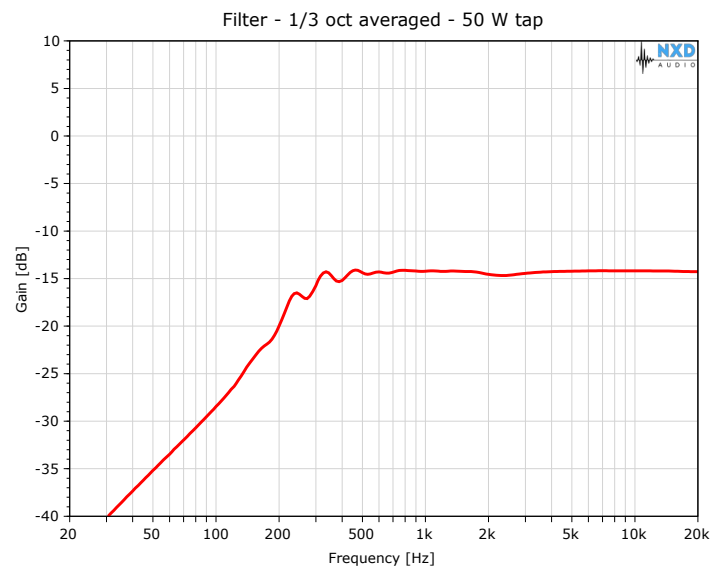
Impedance vs frequency
50 W tap
Half-space



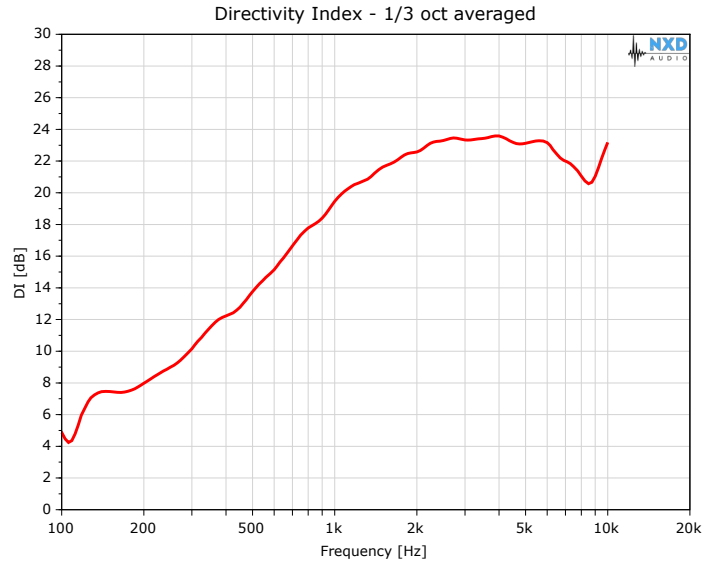
Filter response
1/3 octave averaged
100 W tap



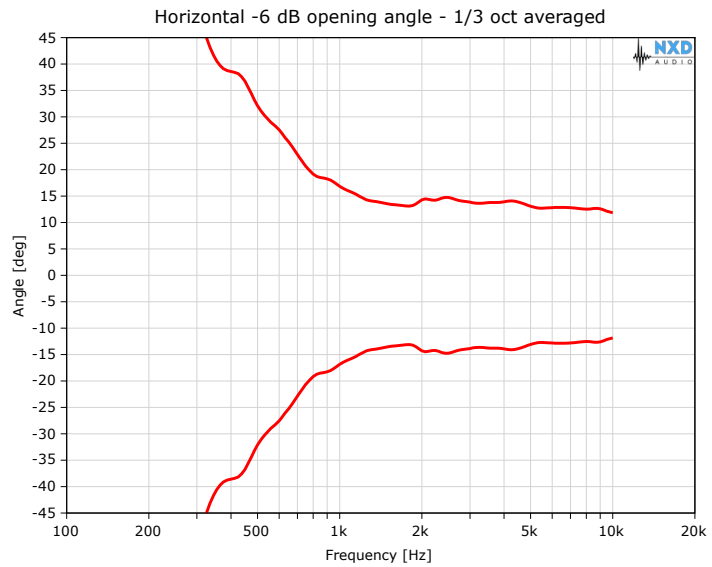
Filter response
1/3 octave averaged
50 W tap



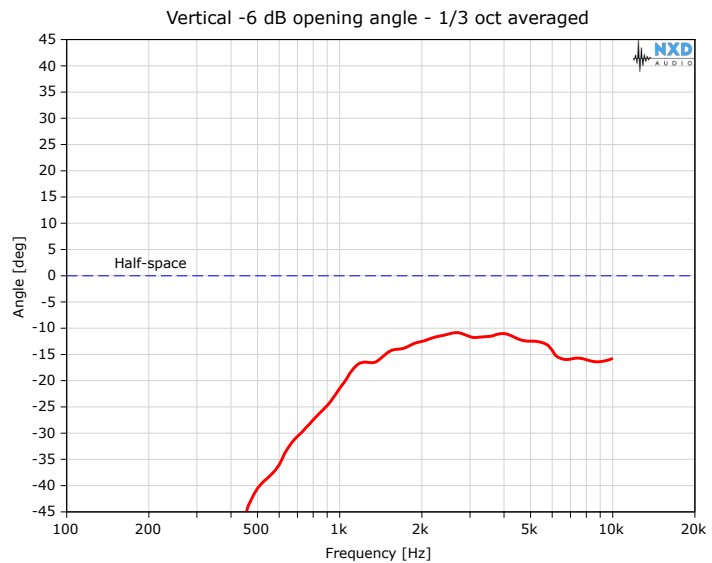
DI vs frequency
 1/3 octave averaged
 4 m
 Half-space



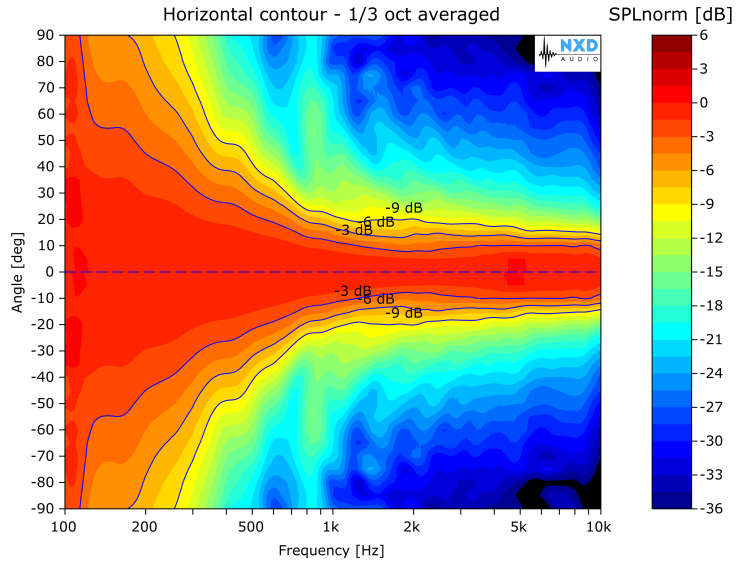
Horizontal -6 dB opening angle
 1/3 octave averaged
 4 m



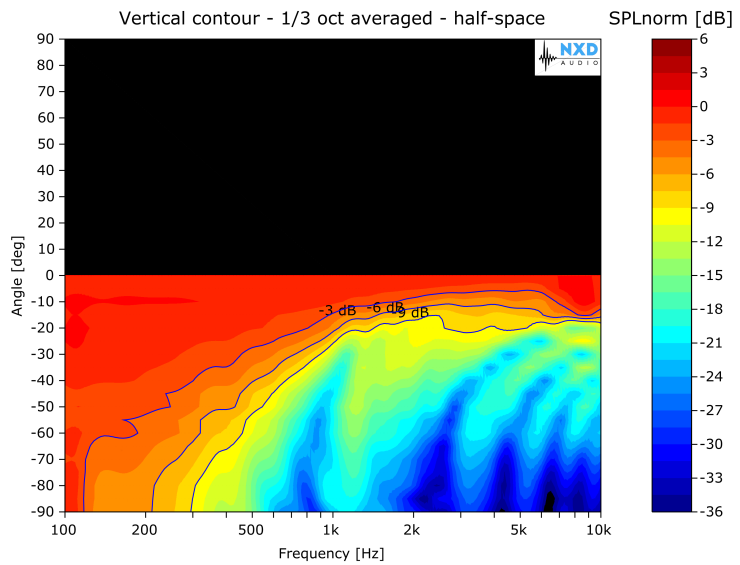
Vertical -6dB opening angle
 1/3 octave averaged
 4 m
 Half-space



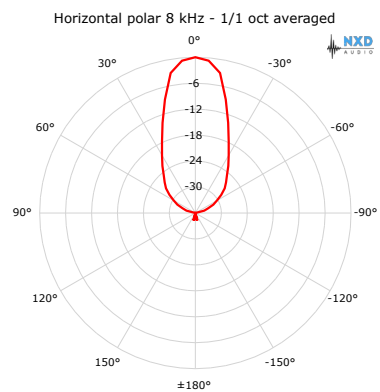
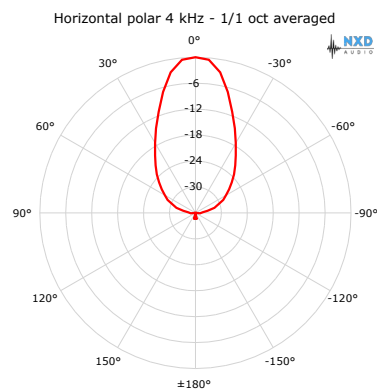
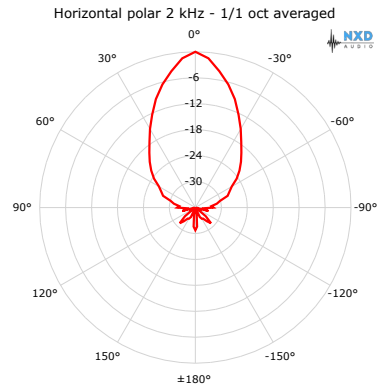
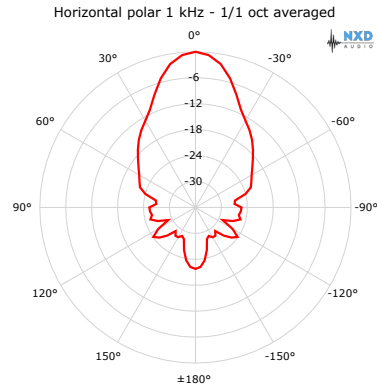
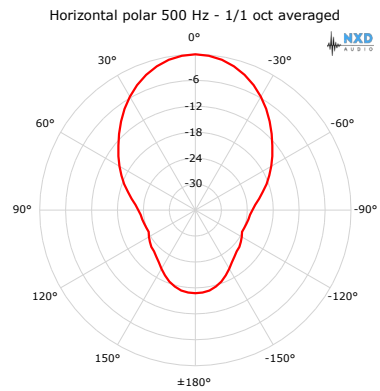
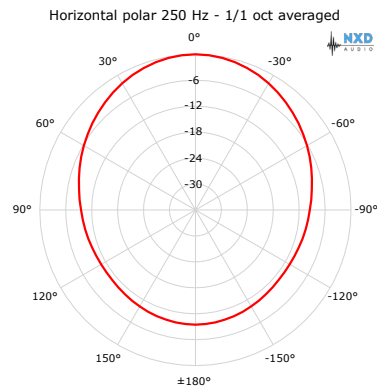
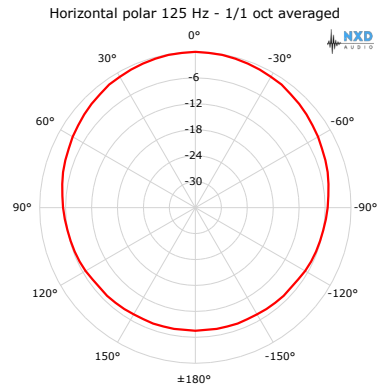
Horizontal contour
1/3 octave averaged
4 m



Vertical contour
1/3 octave averaged
4 m
Half-space

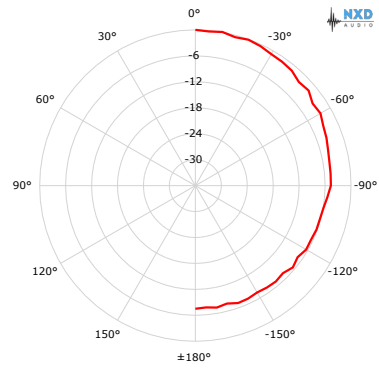


Horizontal polar
1/1 octave averaged
4 m

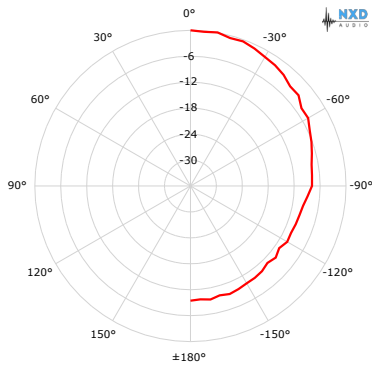


Vertical polar
1/1 octave averaged
4 m
Half-space

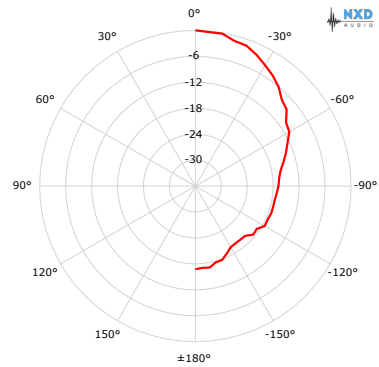
Vertical polar 125 Hz - 1/1 oct averaged



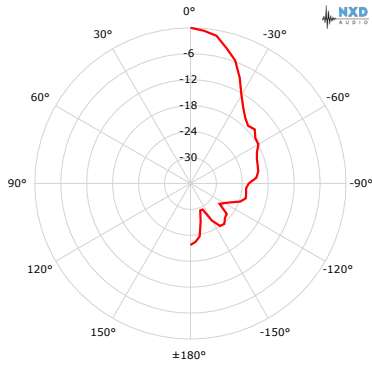
Vertical polar 250 Hz - 1/1 oct averaged



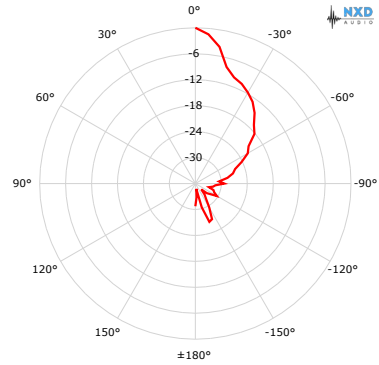
Vertical polar 500 Hz - 1/1 oct averaged



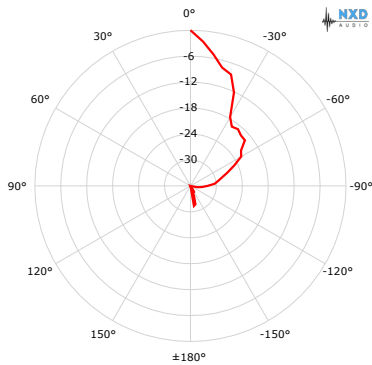
Vertical polar 1 kHz - 1/1 oct averaged



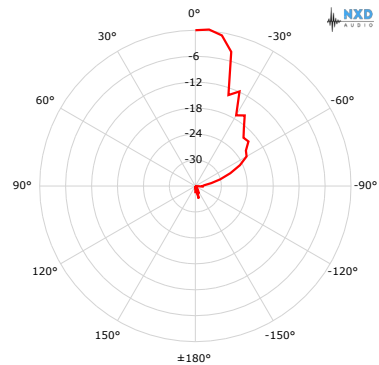
Vertical polar 2 kHz - 1/1 oct averaged



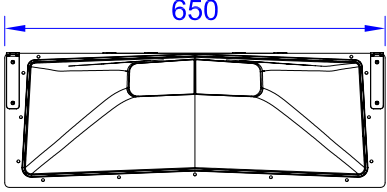
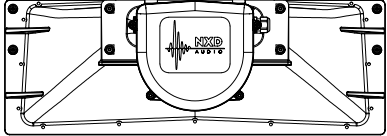
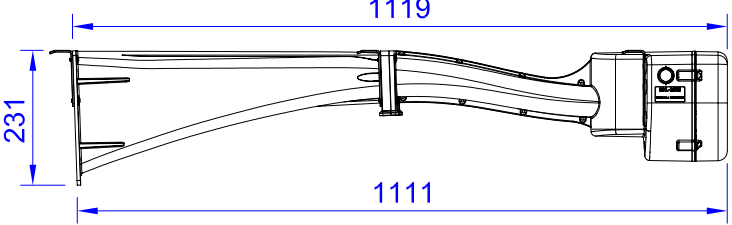
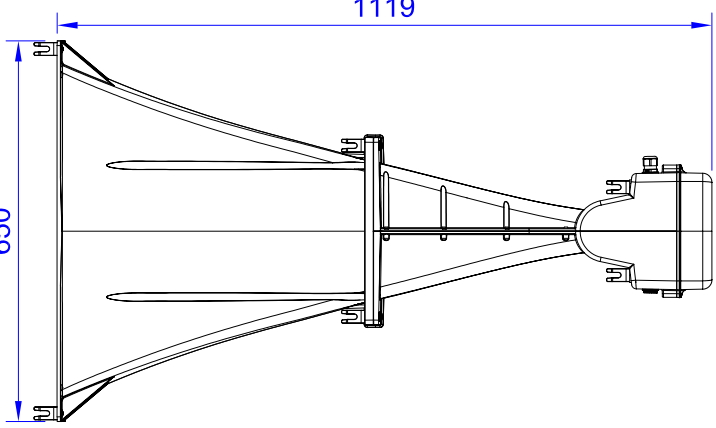
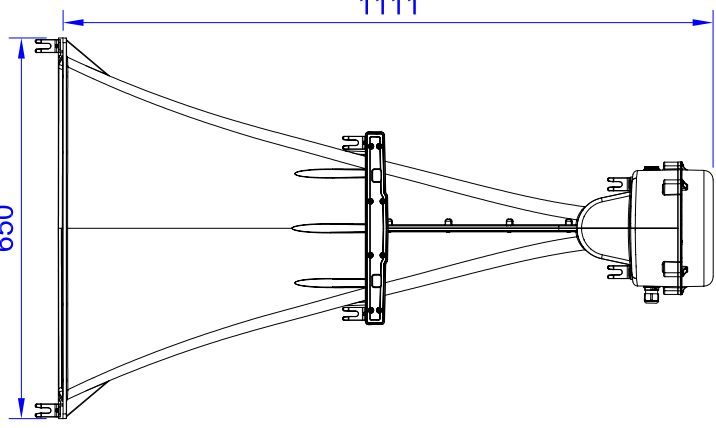
Vertical polar 4 kHz - 1/1 oct averaged



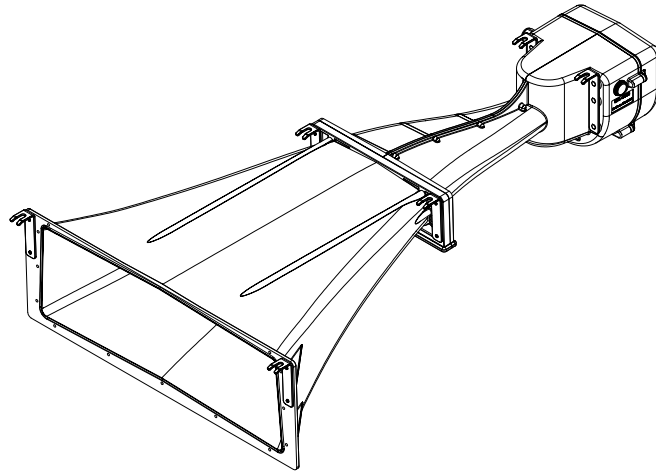
Vertical polar 8 kHz - 1/1 oct averaged



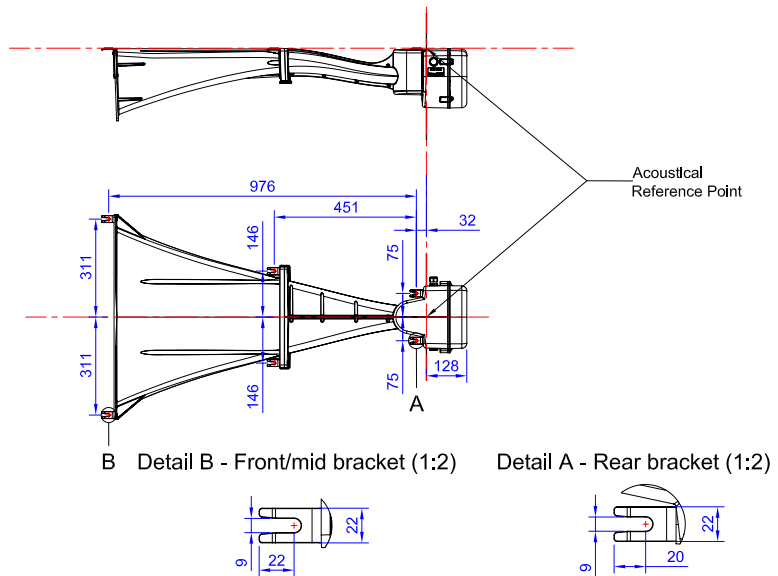
MECHANICAL

<p>Front view</p>	
<p>Rear view</p>	
<p>Side view</p>	
<p>Top view</p>	
<p>Bottom view</p>	

3D view



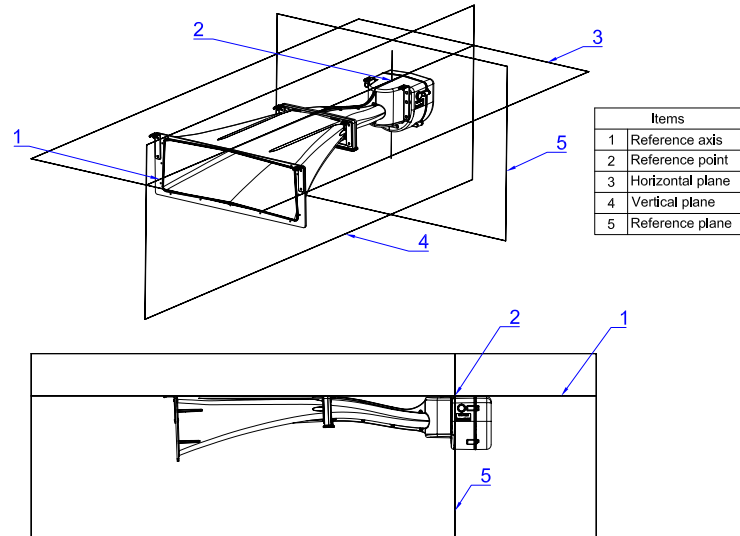
Mounting details



PHYSICAL REFERENCES

Physical references (EN 54-24)

1. Reference axis
2. Reference point
3. Horizontal plane
4. Vertical plane
5. Reference plane



DOCUMENT REVISION

1.0	25-08-2023	Start version. All data, plots and drawings updated to release status.
1.1	02-09-2024	Part numbers with Hirschmann CA 3 GD connector added.
1.3	24-10-2024	Changes terminal block specifications.



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