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Discover the

Ranos dB product range

Wireless outdoor sound monitoring

DSS
Dutch Sensor Systems

Monitor noise all **over the world** with the Ranos dB

The Ranos product range consists of two high accuracy, wireless outdoor sound level meters and cloud applications suitable for permanent and temporary installation anywhere around the world - without a wired power or data connection.

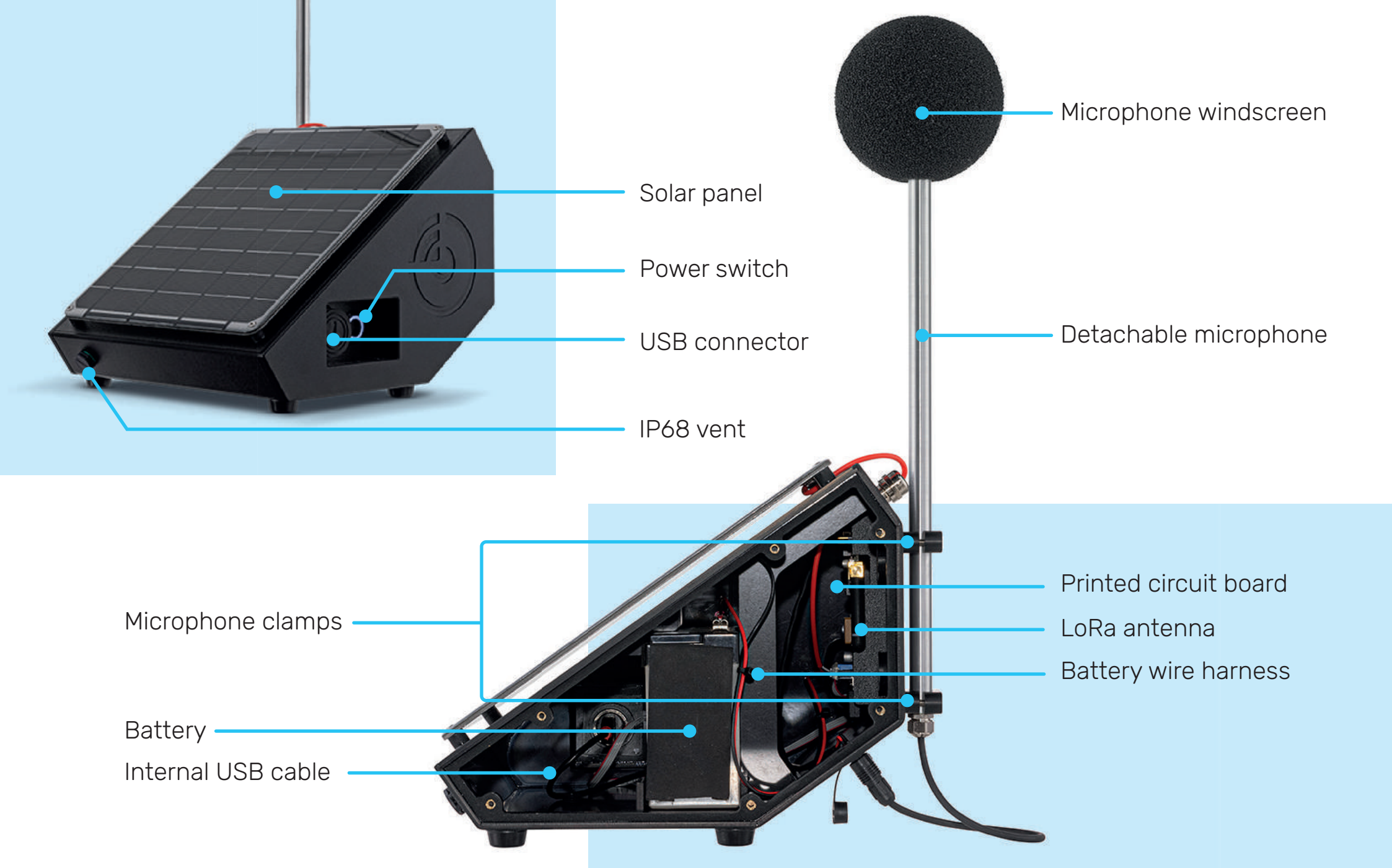
We supply the Ranos dB in a class 1 and a class 2 measurement accuracy version. The Ranos dB is powered by solar energy, works fully autonomously and has LoRa connectivity. This is why you can use this state-of-the-art device anywhere in the world. The housing is made of recyclable ABS material and is completely weatherproof.

We offer a user friendly configuration app and a dashboard for device management, data collection and data visualization.

- High accuracy
- 24/7/365 sound monitoring
- 100% wireless
- Environmentally friendly (zero emission, recyclable)
- Useable all over the world
- Very low maintenance
- Cloud applications

Key features

- Measurement accuracy according to IEC 61672-1:2014 class 1 (dB 1) or class 2 (dB 2), validated by an accredited lab using IEC 61672-3:2013 test procedures.
- Linear dynamic range of 43-120 dB(A) or 40-120 dB(A) according to class 1 and class 2 tolerances respectively.
- Pole mount, wall mount or place it on a surface.
- Detachable free field electret condenser microphone. Extension mounts and cables are available.
- Configurable and continuous sound level measurements.
- Solar powered.
- Synchronization of multiple sound level meters.
- LoRaWAN™ (Class B, EU868, US915, AS923).
- GPS location and time.
- Weatherproof (UV resistant, IP67).
- CE mark.
- Connect App (registration, settings, testing).
- Dashboard (device/project/user management, data collection).


Solar panel
Power switch
USB connector
IP68 vent
Microphone windscreen
Detachable microphone
Microphone clamps
Battery
Internal USB cable
Printed circuit board
LoRa antenna
Battery wire harness

High accuracy

The Ranos dB 1 and Ranos dB 2 measurement accuracy is according to IEC 61672-1:2014 class 1 and class 2 respectively, with a linear dynamic range of 43-120 dB(A) with class 1 tolerances and 40-120 dB(A) with class 2 tolerances. This means that all measurement specifications and/or features that are required by the standard are present. The performance has been validated by an accredited lab using IEC 61672-3:2013 testing procedures. A standard sound calibrator according to IEC 60942 can be used for periodical field calibration. The measurements and calculations run continuously (at a bit depth of 24 bit and a sample rate of 48 kHz), this is necessary for accurate time-averaged continuous sound level measurements and for minimum/maximum sound level measurements. There are no physical differences between the Ranos dB 1 and Ranos dB 2, the only difference is that the dB 1's microphone is factory calibrated and corrected individually using a 200 coefficient FIR filter.

Microphone

The Ranos dB microphones are developed, manufactured and tested in house for optimal performance as part of the product. The microphones are based on an ECM (Electret Condenser Microphone) element. They are robust, relatively low cost, waterproof (IP67) and have a free field sound field property. Additionally, the microphones are detachable for transport and for separate mounting. Optional mounting hardware and cables for separate mounting are available.

Wireless

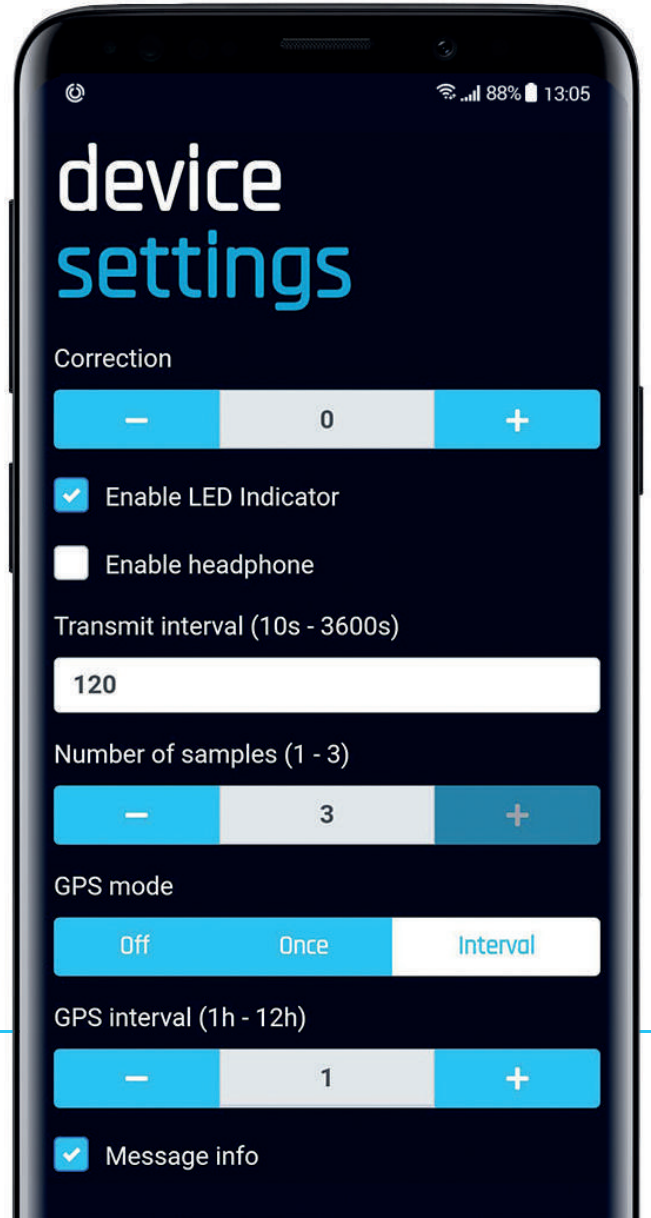
The Ranos products use the LoRa / LoRaWAN radio communication platform and support the EU868, US915 and AS923 frequency plans. It supports Class B networks, allowing the cloud server to send direct messages to the Ranos dB. LoRa's low power consumption and long range enables use in remote locations. The available bandwidth is low, but more than enough for the majority of applications. Additionally, there are several other advantages such as: No or low data subscription cost. No Sim-cards are needed. Several network options are available (public, commercial or set up your own).

GPS

The GPS provides an accurate source of time and location. The location can be included with the payload so it can tell you where it is. This is useful in cases where there are lots of Ranos', or where the Ranos' are constantly moving. No need to pin each Ranos on the map manually. At every new GPS fix, the internal RTC (Real Time Clock) is re-synchronized to the GPS time. This is an important aspect as the timestamp(s) included with each payload needs to be accurate for the data to be useful in comparisons or in time dependent applications. The accurate internal time allows us to implement a time synchronization feature, which synchronizes the sampling and transmission times of multiple Ranos'. The GPS only turns on for a short moment at each (configurable) time interval passing, and the GPS is kept in standby for the rest of the time to reduce power consumption.

Measurements

Lots of measurements consisting of the standard IEC 61672-1:2014 time and frequency weightings are available. The following measurements are available via wireless LoRa communication: LAfast, LAslow, LCfast, LCslow, LAeq, LCeq, LAmax, Lamin, LCmax, LCmin. Detailed information can be found in the instruction manual. The time period over which the minimum, maximum and time-averaged continuous sound level measurements (LAeq, LCeq) are calculated is configurable. One, more or all measurements can be configured to be used simultaneously.



Power

The Ranos dB does not need an external power source, it can run off of the integrated battery and solar panel continuously. Please note that this is not true for all locations. The solar irradiation might not be sufficient the whole year around in the more northern and southern parts of the world. We provide the necessary calculations and information in our instruction manual. A generic type SLA (Sealed Lead Acid) battery is used for its wide charge and discharge operating temperature range. SLA is one of the very few technologies that can be charged in sub zero temperatures.

Weatherproof

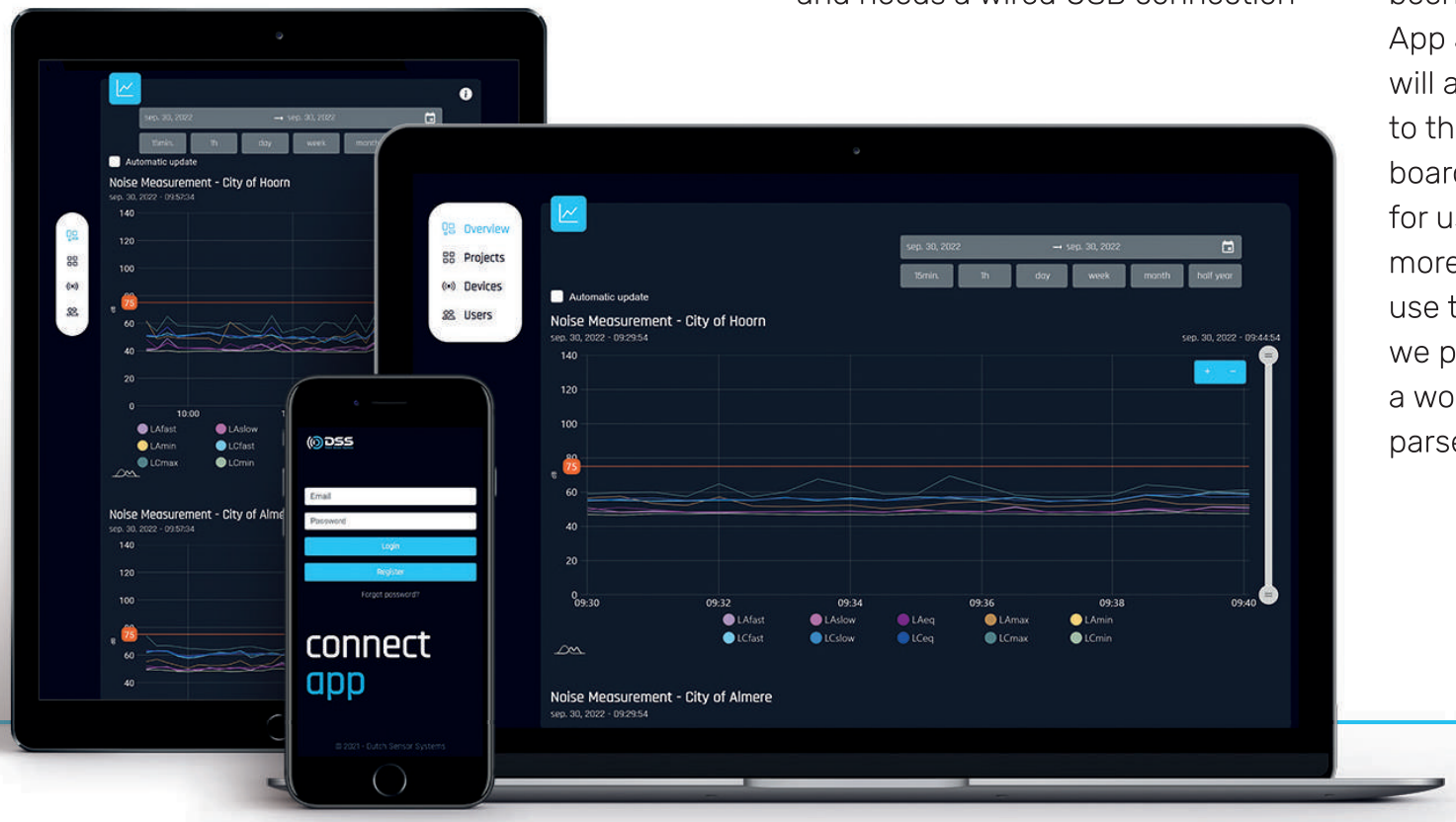
All the Ranos dB's external parts are rated IP67 or better, they are UV resistant and can withstand an operating temperature range of at least -10 to +50 degrees Celsius. Rain is enough to clean off the solar panel in most cases. Manual cleaning might be needed in cases where it is very dusty, or where there is snow for longer periods of time. A special vent membrane that does not let through moisture, but does let through gasses is used to make sure the air volume inside of the housing can expand and contract due to varying weather conditions throughout the day.

Mounting

Three convenient mounting options are available: pole mount, wall mount, or it can be set on top of a surface. All-round, pole mounting is the best mounting solution. It interferes the least with the measurements acoustically. The necessary components for pole mounting are supplied with the Ranos dB as standard. Optionally the Ranos dB can be wall mounted, a wall mounting bracket is available.
To reduce the acoustic influence of a wall or a large diameter pole, the microphone can be mounted at a distance from the object using an optional microphone extension arm and cables. Several arm and cable lengths are available. Lastly it is also possible to set the Ranos dB on top of a surface. Rubber stick-on feet are provided as standard to prevent damage to the bottom of the Ranos dB.

Software

We provide a complete software package for everything from device registration to data collection and visualization. All software is developed to be user friendly and intuitive. No coding or other software knowledge is necessary. The Connect App is available for Windows and Android and needs a wired USB connection with the Ranos. It is used for device registration, configuration, testing and calibration. Additionally, it can be used for true real time monitoring. The Connect Dashboard is available for any OS with a modern web browser. It is used for device management, project management, user management, data collection, data visualization and more. Once a device has been registered using the Connect App and your account, the devices will automatically be made available to that account in the Connect Dashboard. Connect Dashboard is ready for use with TTN, Helium, KPN and more to come. For those who want to use their own software or dashboard, we provide payload information and a working (online) example payload parser.



General			
Applicable standards	IEC 61672-1:2014		
Performance class	Ranos dB 1: class 1 measurement accuracy with MMDB1 microphone Ranos dB: class 2 measurement accuracy with MMDB2 microphone		
RF immunity group	group X		
CE marking:	yes		

Microphones, preamp and conversion			
Microphones	Microphone: Performance class: Type: Sound field: IP rating: Frequency range: Freq. resp. calibration: Output impedance: Sensitivity: Reference SPL: Reference point:	MMDB1 class 1 electret condenser freefield IP67 20 Hz – 20 kHz Yes 2,2k 12,6 mV/Pa (-38dB re 1V/Pa) 94 dB center of microphone diaphragm	MMDB2 class 2 electret condenser freefield IP67 20 Hz – 20 kHz No 2,2k 12,6 mV/Pa (-38dB re 1V/Pa) 94 dB center of microphone diaphragm

	Reference direction: SPL before damage:	0 degrees 140 dB	0 degrees 140 dB
Microphone preamplifier	Integrated, not removable Gain nominally set for MMDB1 and MMDB1 microphones -6 to 6dB gain or attenuation in 0,1dB steps for calibration Input sensitivity: 48,08 mV/Pa or -26,36 dB re 1V/Pa Input impedance: 40k Ohm Input voltage range: 1Vrms (2,83Vp-p) Input bias voltage: 2,97V Input max. bias current: 3mA		
AD and DA conversion	Samplerate: 48 kHz Bitdepth: 24 bit Frequency response: +/-0,05dB 3Hz – 20kHz		

Processing	
Processing type	Digital (everything after signal conditioning, preamp, ADC)
Processing rate Processing precision	48 kHz 56 bit
Microphone correction filter	200 tap FIR filter, pre-set by Dutch Sensor Systems

Measurement quantities		Available in Connect App (cable connection)	Available in Connect Dashboard (wireless connection)
	LAfast	✓	✓
	LAslow	✓	✓
	LAeq	✓	✓
	LAFmin	✓	✓
	LAFmax	✓	✓
	LCfast	✓	✓
	LCslow	✓	✓
	LCeq	✓	✓
	LCFmin	✓	✓
	LCFmax	✓	✓
	LZfast	✓	
	LZslow	✓	
	LZeq	✓	
	LZFmin	✓	
	LZFmax	✓	
	LCpeak	✓	
	LCpeak_min	✓	
	LCpeak_max	✓	
	LZpeak	✓	
	LZpeak_min	✓	
	LZpeak_max	✓	
	LAslow_min	✓	
	LAslow_max	✓	
	LAeq_min	✓	
	LAeq_max	✓	

	LCslow_min	✓
	LCslow_max	✓
	LCeq_min	✓
	LCeq_max	✓
	LZslow_min	✓
	LZslow_max	✓
	LZeq_min	✓
	LZeq_max	✓
LXeq averaging time	1-3600 sec. (applies to all running LXeq measurements)	
Resolution of measurement quantities	0,1 dB	

Measurement specifications							
Level ranges	Single level range of 38-120 dB(A)						
Measurement range per frequency and frequency weighting (Electrical. To +/- 0,8 dB max. deviation) (LXF, LXS, LXeq, electrical)	Freq.	A low	A up	C low	C up	Z low	Z up
	31,5	38	80,6	37	117	49	120
	500	41	116,8	38	120	47	120
	1000	40	120	38	120	49	120
	4000	40	121	37	119,2	49	120
	8000	40	119	40	117	45	120
	12500	41	115,7	40	113,8	49	120

Measurement range at 1 kHz: (electrical, including LCpeak and LZpeak) Upper Lower	LA 120 40	LC 120 38	LZ 120 49	LCpeak 123 47	LZpeak 123 54
Noise floor (electrical)	**Class 1** 31,8 dB(A) 30,1 dB(C) 56,5 dB(Z)	**Class 2** 30,3 dB(A) 30,2 dB(C) 58,8 dB(Z)			
Noise floor (acoustical)	**Class 1** 37,7 dB(A) 42,3 dB(C) 58,1 dB(Z)	**Class 2** 37,2 dB(A) 42,0 dB(C) 58,7 dB(Z)			

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