
AUDIO
08:56:45
TA
Sound Level Meter
96%
123
70
dB
60
50
40
30
20
20Hz
100
630
3.15k
20k
A Z
LZF

-.- dB
A
125 Hz
LZF
live
58.5 dB
1/3 Oct
LOGGING
00:40:56
AUDIO
XL3
ESC
OK
START
STOP

XL3 Technical Data

Version: V 1.48 Rev. 2025-06-20

Firmware: V 1.48

1 Technical data XL3

All specifications comply with the IEC61672 standard. Further standards – as far as they go beyond this standard – are listed with the respective items.

Sound level measurement	
Calibratable product configurations class 1	• XL3 and the M2340 / M2230 measurement microphone builds an integrating sound level meter with type approval class 1 according to IEC 61672 and ANSI S1.4.
Product configurations class 1	• XL3 with M2340 / M2230 measuring microphone class 1 according to IEC 61672 and ANSI S1.4; • XL3 with M2211 / M2215 measurement microphone class 1 frequency response according to IEC 61672 and ANSI S1.4. The specifications given apply to operation with the microphone attached or detached.
Product configurations class 2	• XL3 with M4261 measurement microphone class 2 according to IEC 61672 and ANSI S1.4.
Standards	• IEC 61672:2014, IEC 61672:2003, IEC 61260:2014, IEC 61260:2003, IEC 60651, IEC 60804; • China: GB/T 3785:2010, GB/T 3241, GB 3096-2008, GB 50526, GB/T 4959; • Germany: DIN 15905-5, DIN 45657:2014, DIN 45657:2005, DIN 45645-2, optional: DIN 45645-1; • Japan: JIS C1509-1:2005, JIS C 1513 class 1, JIS C 1514 class 0; • Switzerland: V-NISSG, NAO; • UK: BS 4142:2014, BS 5969, BS 6698; • USA: ANSI S1.4-2014, ANSI S1.43, ANSI S1.11-2014; • International IEC standards have been adapted as European standards and the letters IEC have been replaced by EN. XL3 is compliant with these EN standards.
Weighting	• Frequency weighting: A, C, Z (simultaneously); • Time ratings: Fast, Slow, Impulse[1] (simultaneously).
Level details	• Measurement bandwidth (–3 dB): 4.4 Hz – 23.0 kHz; • Level resolution: 0.1 dB; • Intrinsic noise: 2.1 µV(Z).

[1]Only available with Extended Noise Measurement Option

Sound level measurement	
Measuring range with different microphones	• XL3 + M2340: 17.4 dB(A) – 138.3 dB @ 42 mV/Pa; • XL3 + M2230: 17.1 dB(A) – 137.8 dB @ 42 mV/Pa; • XL3 + M2215: 25 dB(A) – 153 dB @ 8 mV/Pa; • XL3 + M2211: 21 dB(A) – 144 dB @ 20 mV/Pa; • XL3 + M2914: 6.5 dB(A) – 103 dB @ 320 mV/Pa; • XL3 + M4261: 27 dB(A) – 146 dB @ 16 mV/Pa.
Linear measuring range according to IEC 61672 / ANSI S1.4	• XL3 + M2340: 25 dB(A) – 138 dB | 28 dB(C) – 138 dB @ 42 mV/Pa; • XL3 + M2230: 24 dB(A) – 137 dB | 27 dB(C) – 137 dB @ 42 mV/Pa; • XL3 + M2215: 33 dB(A) – 153 dB @ 8 mV/Pa; • XL3 + M2211: 29 dB(A) – 144 dB @ 20 mV/Pa; • XL3 + M2914: 14 dB(A) – 103 dB @ 320 mV/Pa; • XL3 + M4261: 33 dB(A) – 146 dB @ 16 mV/Pa.
Stabilization time after activation of the phantom power	• < 10 s.
Integration times	• Minimum: 1 second (default) or 100 ms (with Extended Noise Measurement option); • Maximum: 24 hours.
Intrinsic noise typical without measuring microphone @ S = 42 mV/Pa	• Frequency weighting A: 5.1 dBA; • Frequency weighting C: 4.1 dBC; • Frequency weighting Z: 8.0 dBZ.

Sound level measurement	
Standard functions	• SPL actual, Leq, Lmin, Lmax, Lpeak, LE; • Time weighting Fast, Slow; • Broadband, 1/1 Octave and 1/3rd Octave spectral view; • Gliding LAeq and LCeq with selectable time window from 1 second to 1 hour; • TaktMax according to DIN 45645-1; • All measurement results are simultaneously available; • Logging of all or data or subsets in selectable intervals ≥ 1 second; • Wizard for measuring the correction values for live events of the levels LAeq, LCeq and LCpeak; • Individual limit values for each sound level displayed; • Recording of compressed audio; • Digital I/O interface for controlling accessories (e.g. Input Keypad XL3 or a weather station).
Functions of Extended Noise Measurement option	• Time weighting Impulse; • Level difference LAIeq – LAeq; • Sound exposure level LAE; • Time-graph view; • Percentiles / levels of the level frequency distribution for broadband and spectral measurements Flexible setting from 0.1% to 99.9% with 7 values in parallel Sampling rate for Fast/Slow weighted values: every 1.3 ms Wideband: with 0.1 dB class bandwidth, based on Lxy sampling (x = A, C or Z, y = F, S or EQ1") 1/1 Octave band and 1/3rd Octave band spectrum: in 1.0 dB class width, based on Lxy (x = A, C or Z / y = F or S); • 100 ms logging of all or data or subsets; • Recording of uncompressed audio.
Spectrum	• Compliant with class 1 of IEC 61260:2014 and ANSI S1.11-2014 (filter base 10); • Octave band display: 8 Hz – 16 kHz; • 1/3rd Octave band display: 6.3 Hz – 20 kHz; • Selectable frequency range is displayed together with A/Z wideband level; • Logging of Leq, min, max every 100 ms[1] or 1 s.

[1]Only available with Extended Noise Measurement Option

Reverberation Time	

Standard functions	• Conforms with ISO 3382 and ASTM E2235 based on Schroeder's backwards integration;
	• Octave bands results from 63 Hz - 8 kHz;
	• Measurement parameters: T20, T30;
	• Impulse and gated noise source;
	• Automatic averaging for each position;
	• Chart and table representation of results;
	• Fixed minimum trigger level: 80 dB LAPK;
	• Warning indicators according to ISO 3382;
	• Range: 10 ms - 60 seconds;
	• Minimum reverberation time (typical):
	  ◦ < 100 Hz: 0.3 second;
	  ◦ 100 - 200 Hz: 0.2 second;
	  ◦ > 200 Hz: 0.1 second.

With the "Extended Room Acoustics" Option	• 1/3 octave band: 50 Hz - 10 kHz; • T20, T30, T15, EDT simultaneously; • Calculating spatial room average (Measurement Series) up to 99 positions; • Audio recording (32-bit float); • Adjustable minimum trigger level from 50 to 100 dB LAPK.

Sound Insulation	
With the "Sound Insulation" Option	Determination of airborne, impact and facade sound insulation on the instrument. • Automated data averaging; • Results as chart and table.

	Airborne Sound Insulation:
	• Sound Sources: Speaker.
	• Standards:
	  • ISO16283-1:2014;
	  • ASTM E336;
	  • England/Wales: Approved Document E (2003).
	• Results:
	  • Dw | Dn,w | DnT,w | R'w;
	  • Spectrum adaption terms C, Ctr;

	Impact Sound Insulation:
	• Sound Sources: Tapping Machine, Rubber Ball;
	• Standards:
	  • ISO16283-2:2018;
	  • ASTM E336;
	  • England/Wales: Approved Document E (2003).
	• Results:
	  • With Tapping Machine: L'n,w | L'nT,w;
	  • With Impact Ball: L'IA,Fmax | L'iA, Fmax,V,T;
	  • Spectrum adaption terms CI.

	Facade Sound Insulation:
	• Sound Sources: Element Loudspeaker, Global Loudspeaker;
	• Standards:
	  • ISO16283-3:2016;
	  • ASTM E336.
	• Results:
	  • With Element Loudspeaker: Dw | R'45°,w;
	  • With Global Loudspeaker: Dls,2m,w | Dls,2m,n,w | Dls,2m,nT,w;
	  • Spectrum adaption terms C, Ctr—.

STIPA	

STIPA
 	
Speech Intelligibility (optional)
	• Measurement in accordance with the standards:
	  • IEC 60268-16 (edition 2, 3, 4 or 5);
	  • AS 1670.4;
	  • BS 5839-8;
	  • CEN/TS 54-32:2015;
	  • DIN EN 50849:2017;
	  • ISO 7240-16;
	  • ISO 7240-19:2007;
	  • DIN VDE 0833-4;
	  • VDE V 0833-4-32:2016;
	  • VDE 0828-1:2017-11;
	  • NFPA 72;
	  • UFC 4-021-01.
	• Direct measurement method (IEC 60268-16);
	• Frequency range: 125 Hz - 8 kHz in octave band;
	• Modulation frequencies 0.63 Hz - 12.5 Hz in thirdoctave resolution;
	• Single value STI and CIS test result;
	• Ambient noise correction;
	• Automated averaging of measurements;
	• Modulation indices and individual band level results with error indicator;
	• Test signal: NTi Audio STIPA signal generated by the MR-PRO, NTi Audio TalkBox or other audio players (download wav-file at my.nti-audio.com/support/xl3).

Calibration	

Free-field correction	• Class 1 sound calibrator 94 dB (NTi Audio #: 600 000 402):
	  • M2215 / M2211: –0.12 dB.
	• Class 1 sound calibrator 94 dB (NTi Audio #: 600 000 402) with 1/4" calibrator adapter NTi (Audio #: 600 000 404):
	  • M4260 (Legacy): +0.10 dB;
	  • M4261 (Legacy): +0.20 dB;
	  • M4262: +0.10 dB.

Calibration						
	M2230 / M2340 Configuration	**Sound Calibrator**				
		NTi CAL200	**B&K 4231**	**Nor 1251**	**Nor 1256**	**Cirrus CR:515**
Windscreen correction @ 1 kHz	No Accessory; Windscreen 90mm[1]; Windscreen 50mm[1]; WP40 Community[1] (horizontal); WP40 Aircraft[1](vertical).	93.88 / -0.12	93.85 / -0.15	93.85 / -0.15	93.85 / -0.15	93.70 / -0.30
	WP30 vertical (Legacy)	93.69 / -0.31	93.66 / -0.34	93.66 / -0.34	93.66 / -0.34	93.51 / -0.49
	WP30 horizontal (Legacy)	93.69 / -0.31	93.66 / -0.34	93.66 / -0.34	93.66 / -0.34	93.51 / -0.49
Calibration	• Recommended calibration interval: 1 year; • Microphone calibration with external sound calibrator possible; • Calibration certificate for a new sound level meter is optionally available.					

Input / output interfaces	

Audio input	• XLR balanced:
	  • Input impedance 200 kΩ;
	  • Phantom power: +48 V switchable; with maximum output current of 10 mA according to IEC 61938;
	  • Automatic Sensor Detection (ASD) for NTi Audio measuring microphones and preamplifier MA230 / MA220;
	• Internal speech microphone for recording voice memos.

Audio output	• Built-in speaker; • Headphone socket 3.5 mm stereo; output reference: @ SPL Level 114.0 dBSPL (calibrated microphone) = –12 dBu.
USB-A interface	USB Host supporting the devices described below.
USB-C interface	USB Device supporting MTP (file access from the PC) and Network (website access from the PC), as well as charging the Li-Ion battery.

[1]All required additional correction is handled by the instrument.

Input / output interfaces	
USB devices	Supported devices: • USB-C to LAN adapter, NTi # 600 000 535; • 4G/LTE gateways with RNDIS protocol; • Mass storage like USB stick, SSD; • Vaisala or LCJ Capteurs weather station (see below).
Memory	32 GB micro-SDHC card (default), replaceable, for storing measurement data in ASCII format, as well as audio data (WAV) and screenshots (PNG) Supported formats: FAT32 and NTFS

Power supply	• Rechargeable Li-Ion battery:
	  • Typ. 3.6 V / 6'000 mAh;
	  • Voltage range: 3.0 – 4.07 VDC (theXL3 limits the charging voltage to 4.05 VDC, and thus doubles the number of possible charging cycles);
	  • Energy density = 339 Wh/l;
	  • Typical battery life @ 25 °C (77 °F) with microphone M2340:
	  with display active: >8 h;
	  with display switched off: >12 h.
	  • Operating temperature: –20 to +60 °C (–4 to +140 °F);
	  • The XL3 switches OFF automatically as soon as either the battery charge level drops to 0%, or the temperature of the battery drops below –19 °C (–2.2 °F) or rises above +60 °C (+140 °F). Before an automatic self-shut-down, the XL3 stops the current measurement and saves the present results.
	• Linear external power supply 9 VDC / 2 A:
	  • Range: 7.0 – 17.0 VDC @ minimum 4 W;
	  • Charges Li-Ion battery in operation; charging time from 10% to 80%: typ. 140 min;
	  • Maximum charging power 15 W.
	• USB-C supply with 5 VDC / 1.5 – 3 A / 5 W or 15 W according to USB-C specification release 1.2 is sufficient to operate the XL3 + charge the battery; USB BC1.2 is not supported;
	• USB-A supply with 5 VDC / 0.5 A (e.g via a USB-A to USB-C adapter) does not provide sufficient power to supply the XL3.

Automatic restart	The XL3 automatically turns back ON and resumes the last active measurement: a. after an automatic self-shutdown (due to too low charge level), or; b. after unintentional removal of the battery (while the device was running); c. as soon as it is is reconnected to a voltage source (e.g. power supply unit or charged battery).

Weather station	
Vaisala	• WXT532; • WXT533; • WXT536.
LCJ Capteurs	LCJ SONIC-ANEMO-DLG-USB.

General	

Clock	• Real-time clock:
	  • with lithium backup battery
	  • Drift: < 100 ms (typ.), < 2.42s (max) per 24h
	  • Time is corrected when NTP or PPS is available
	• System time:
	  • Synced to RTC on startup
	  • No drift when NTP or PPS are available
	  • Drift without NTP or PPS: < 300 ms (typ.), 2.16 s (max) per 24h
	• Clock for data acquisition:
	  • Synced to System time on measurement start/daily
	  • Drift: < 1 ms (typ.), < 389 ms (max.)

Mechanics	• 1/4" tripod connection and fold-out stand on rear side • Display: 480 x 800 pixels, 4.3" IPS • Entry: 8 buttons, capacitive multitouch-display • Dimensions L x W x H: 210 x 85 x 45 mm (8.3 x 3.4 x 1.8 ") • Weight: 500 g (1.1 lb) including Li-Ion battery
Temperature	–10 to +50 °C (+14 to +122 °F)
Humidity	5 to 90% RH, non-condensing
Sensitivity to high frequency fields	Classification group X
Electromagnetic compatibility	CE according to: EN 61326-1 class B, EN 55011 class B, EN 61000-4-2 to -6 and -11
Protection class	IP51
ATEX	• For applications in Zone 2 hazardous areas according to IEC 60079 • Compliant with 2014/34/EU

2 Technical Data Measurement Microphones

2.1 Certified Class 1 Measuring Microphones

	M2340 Class 1 certified with self-examination	M2230 class 1 certified
Scope of delivery	MA230 preamplifier + MC230A microphone capsule	MA220 preamplifier + MC230A microphone capsule
Microphone type	Omnidirectional, condenser free-field microphone with continuous polarization	
Classification according to IEC 61672 and ANSI S1.4	Class 1 certified	
Microphone capsule	½" removable with thread 60UNS2 type WS2F according to IEC 61094-4	
Preamplifier type	MA230	MA220
Self-check	Yes	No
Frequency response tolerance typical	±1 dB @ 5 Hz – 20 Hz ±1 dB @ >20 Hz – 4 kHz ±1.5 dB @ >4 kHz – 10 kHz ±2 dB @ >10 kHz – 16 kHz ±3 dB @ >16 kHz – 20 kHz	
Individual frequency response	Freely available as Excel file: register the microphone on my.nti-audio.com and contact info@nti-audio.com	
Frequency range	5 Hz – 20 kHz	
Intrinsic noise typical	17 dB(A)	16 dB(A)
Maximum sound pressure level @ distortion factor 3%, 1 kHz	138 dBSPL	137 dBSPL
Sensitivity typical @ 1 kHz	27.5 dBV/Pa ±2 dB (42 mV/Pa)	
Temperature coefficient	< –0.015 dB / °C	
Temperature range	–10°C to +50°C (14°F to 122°F)	
Influence of air pressure	0.005 dB / kPa	
Influence of humidity (non-condensing)	< ±0.05 dB	
Humidity	5% to 90% RH, non-condensing	

	M2340 Class 1 certified with self-examination	M2230 class 1 certified
Long-term stability	> 250 years / dB	
Power supply	48 VDC phantom power	
Power consumption	0.76 mA typical	2.3 mA typical
Electronic data sheet	NTi Audio ASD according to IEEE P1451.4 V1.0, Class 2, Template 27	
Output impedance	100 Ω symmetrical	
Output connector	balanced 3-pin XLR	
Diameter	20.5 mm (0.8")	
Length	154 mm (6.1")	
Weight	100 g, 3.53 oz	
Protection class	IP51	
NTi Audio #	600 040 230	600 040 050

2.2 Measuring Microphones

	M2211 frequency response class 1	M2215 for high sound levels, frequency response class 1	M4261 class 2 (Legacy)	M4262 class 2
Includes	MA220 preamplifier + M2211 microphone capsule	MA220 preamplifier + M2215 microphone capsule	M4261 (Legacy) with fixed microphone capsule	M4262 with fixed microphone ECM capsule
Microphone type	Omnidirectional, condenser free-field microphone with continuous polarization		Electret capsule	
Classification according to IEC 61672 and ANSI S1.4	Frequency response class 1		Class 2	
Microphone capsule	1/2" removable with thread 60UNS2 type WS2F according to IEC 61094-4		1/4" fixed mounted	
Preamplifier type	MA220		-	
Self-check	No			

	M2211 frequency response class 1	M2215 for high sound levels, frequency response class 1	M4261 class 2 (Legacy)	M4262 class 2
Frequency response tolerance typical	±1 dB @ 5 Hz – 20 Hz ±1 dB @ >20 Hz – 4 kHz ±1.5 dB @ >4 kHz – 10 kHz ±2 dB @ >10 kHz – 16 kHz ±3 dB @ >16 kHz – 20 kHz		+1/-4.5 dB @ 5 Hz – 20 Hz ±1.5 dB @ >20 Hz – 4 kHz ±3 dB @ >4 kHz – 10 kHz ±45 dB @ >10 kHz – 16 kHz ±5 dB @ >16 kHz – 20 kHz	+1/-5 dB @ 5 Hz – 20 Hz ±1.5 dB @ 20 Hz - 4 kHz ±3 dB @ 4 kHz – 20 kHz
Individual frequency response freely available as Excel file	Freely available as Excel file: register the microphone on my.nti-audio.com and contact info@nti-audio.com			
Frequency range	5 Hz – 20 kHz			10 Hz – 30 kHz
Typical sensitivity @ 1 kHz	- 34 dBV/Pa ±3 dB (20 mV/Pa)	- 42 dBV/Pa ±3 dB (8 mV/Pa)	- 36 dBV/Pa ±3 dB (16 mV/Pa)	-36 dBV/Pa ±3 dB (16 mV/Pa)
Intrinsic noise typical	21 dB(A) SPL @ 20 mV/Pa	25 dB(A) SPL @ 8 mV/Pa	27 dB(A) SPL @ 16 mV/Pa	32 dB(A) SPL @ 16 mV/Pa
Maximum sound pressure level @ distortion factor 3%, 1 kHz	144 dBSPL	153 dBSPL	142 dBSPL	140 dB SPL
Temperature coefficient	< ±0.015 dB / °C		< ±0.02 dB / °C	< ±0.03 dB / °C
Temperature range	–10°C to +50°C (14°F to 122°F)		0°C to +40°C (32°F to 104°F)	
Pressure coefficient	0.02 dB / kPa		-0.04 dB / kPa	
Influence of humidity (non-condensing)	< ±0.05 dB		< ±0.4 dB	
Humidity	5% to 90% RH, non-condensing			
Long-term stability	> 250 years / dB		-	
Power supply	48 VDC phantom power			
Power supply current	2.3 mA typical		1.7 mA typical	1.4 mA idle, 5 mA @ clip level
Electronic data sheet	NTi Audio ASD according to IEEE P1451.4 V1.0, Class 2, Template 27			

	M2211 frequency response class 1	M2215 for high sound levels, frequency response class 1	M4261 class 2 (Legacy)	M4262 class 2
Output impedance	100 Ω symmetrical			
Output connector	balanced 3-pin XLR			
Diameter	20.5 mm (0.8")			Housing: 20.5 mm (0.8''), Neck: 7.8 mm (0.3''), Recess for calibrator: 7 mm
Length	150 mm (5.9")			
Weight	100 g, 3.53 oz		83 g, 2.93 oz	83 g, 2.93 oz
Protection class	IP 51			
NTi Audio #	600 040 022	600 040 045	600 040 070	600 040 075

	M2914 Low-Noise
Microphone type	Omnidirectional, pre-polarized condenser,free field microphone
Capsule / transducer	1/2” detachable with 60UNS2 thread, type WS2F according IEC 61094-4 matched with preamplifier
Preamplifier type	MA214
Flatness tolerance bands typical	±2 dB @ 10 Hz – 16 kHz ±3 dB @ 5 Hz – 20 kHz
Typical sensitivity @ 1 kHz	320 mV/Pa
Residual noise floor typical	6.5 dB(A)
Maximum SPL @ THD 3%, 1 kHz, S_typical	Peak 103 dB / RMS 100 dB
Temperature coefficient	< ±0.01 dB / °C
Temperature range	–20°C to +60°C (–4°F to 140°F)
Pressure coefficient	–0.00001 dB/Pa
Humidity	< 90% R.H., non-condensing
Power supply	ICP
Power supply current	4 – 20 mA typical

	M2914 Low-Noise
Output impedance	< 100 Ω
Connector	BNC
Diameter	12.7 mm (0.5"), protection grid 13.2 mm (0.52")
Length	135 mm (5.3”)
Weight	250 g (8.8 oz)
Windscreen diameter	50 mm (2")
NTi Audio #	600 040 240

2.3 Technical Data Microphone Preamplifiers

	MA230	MA220
Microphone preamplifier	Compatible with 1/2" microphone capsules type WS2F according to IEC61094-4	
Typical Frequency range	1.3 Hz – 50.0 kHz	2.5 Hz – 50 kHz
Frequency Response flatness	±0.2 dB, 10 Hz - 20 kHz	±0.2 dB, 10 Hz - 20 kHz
Phase linearity	<±5° @ 20 Hz - 20 kHz	<±10° @ 20 Hz - 20 kHz
Intrinsic noise typical	2.4 µV(A) @ C_{in} 15 pF ≙9.1 dBA @ 42 mV/Pa	1.6 µV(A) @ C_{in} 18 pF ≙5.6 dBA @ 42 mV/Pa
Maximum output voltage	22 Vpp ≙7.78 Vrms ≙139.3 dBSPL @ 42 mV/Pa	21 Vpp ≙7.4 Vrms ≙138.9 dBSPL @ 42 mV/Pa
Electronic data sheet	• Contains calibration data • Original NTi Audio sensitivity = 4.9 V/Pa • Save and read data with XL3 Analyzer • NTi Audio ASD according to IEEE P1451.4 V1.0, class 2, template 27	
Self-check	Yes	No
Humidity	5% to 90% RH, non-condensing	
Power supply	48 VDC phantom power	
Power supply current	0.76 mA typical	2.3 mA typical
Electronic data sheet	NTi Audio ASD according to IEEE P1451.4 V1.0, class 2, template 27	
Output impedance	100 Ω symmetrical	
Output connector	balanced 3-pin XLR	
Diameter	20.5 mm (0.8")	

	MA230	MA220
Length	154 mm (6.1")	
Weight	100 g, 3.53 oz	
Protection class	IP51	
NTi Audio #	600 040 200	600 040 050

2.4 Free-field correction

All NTi Audio measurement microphones are free-field equalized measurement microphones. The irritation of the free-field level, due to the presence of the microphone body in the sound field, is already compensated for in the microphone.

As sound calibrators operate in the pressure field, the level at the microphone diaphragm differs for 1/2" measurement microphones at the reference ambient conditions.

For most accurate calibration of the microphone sensitivity, the following free-field correction shall be applied when using a class 1 sound calibrator. The table below shows the target values for a microphone calibration with a sound level calibrator that is adjusted to 94.0 dB, and the correction values for different configurations.

Sound calibrator	NTi CAL200	B&K 4231	Nor 1251	Nor 1256	Cirrus CIR:515
M2230 / M2340 Configuration	93.88 / -0.12	93.85 / -0.15	93.85 / -0.15	93.85 / -0.15	93.70 / -0.30

2.4.1 Application example

Configuration:

- XL3 + M2340 measurement microphone + WP40 vertically;
- NTi Audio CAL200 class 1 sound calibrator with 94.0 dB;

Setting for calibration:

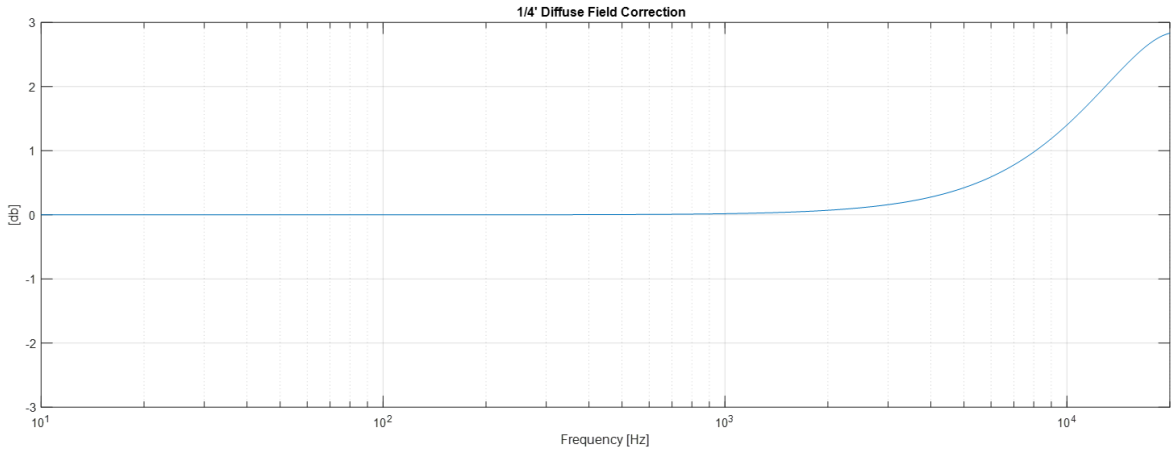
- Open the Calibration screen;
- Adjust the **Calibrator** level to 93.88 dB (*refer to the table above*);
- Plug the sound calibrator onto the microphone and turn it ON;
- Tap on **START** and then on **OK**.



The calibration has been completed successfully.

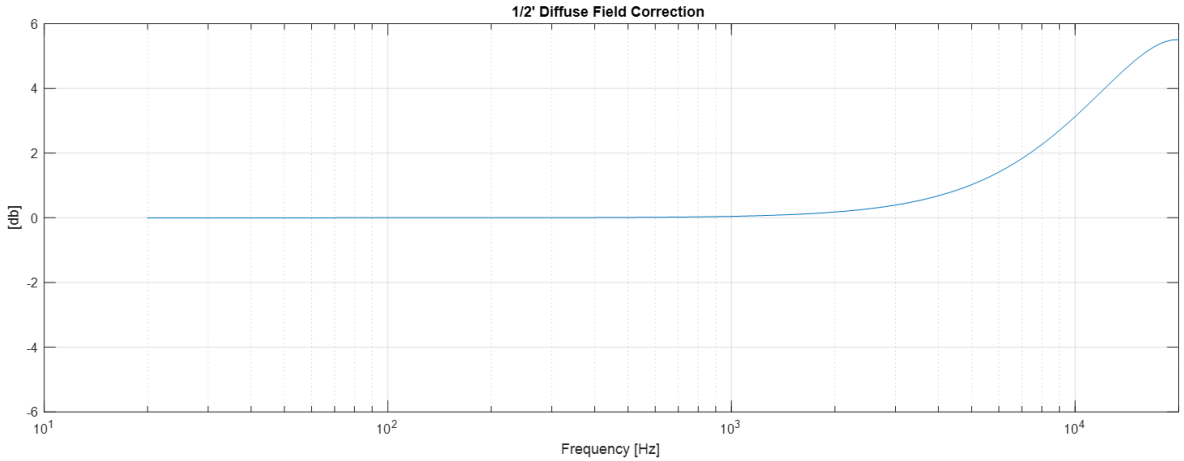
2.5 Diffuse field correction

2.5.1 M4261 1/4" microphone



Frequency [Hz]	200	250	315	400	500	630	800	1000
Correction [dB]	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02
Frequency [Hz]	1060	1120	1180	1250	1320	1400	1500	1600
Correction [dB]	0.02	0.02	0.02	0.03	0.03	0.03	0.04	0.05
Frequency [Hz]	1700	1800	1900	2000	2120	2240	2360	2500
Correction [dB]	0.05	0.06	0.06	0.07	0.08	0.09	0.10	0.11
Frequency [Hz]	2650	2800	3000	3150	3350	3550	3750	4000
Correction [dB]	0.12	0.14	0.16	0.17	0.20	0.22	0.24	0.28
Frequency [Hz]	4250	4500	4750	5000	5300	5600	6000	6300
Correction [dB]	0.31	0.35	0.38	0.42	0.47	0.52	0.59	0.65
Frequency [Hz]	6700	7100	7500	8000	8500	9000	9500	10000
Correction [dB]	0.72	0.80	0.88	0.98	1.08	1.19	1.29	1.40
Frequency [Hz]	10600	11200	11800	12500	13200	14000	15000	16000
Correction [dB]	1.53	1.65	1.78	1.92	2.05	2.19	2.36	2.50
Frequency [Hz]	17000	18000	19000	20000				
Correction [dB]	2.62	2.72	2.79	2.83				

2.5.2 M2340 1/2" microphone

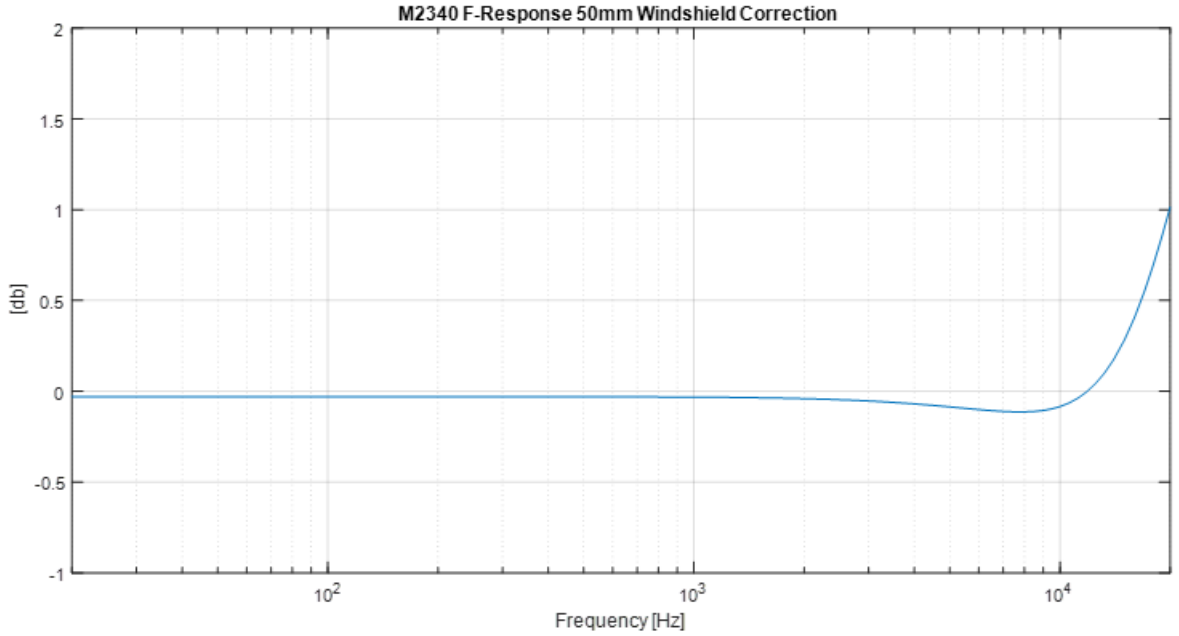


Frequency [Hz]	200	250	315	400	500	630	800	1000
Correction [dB]	0.00	0.00	0.00	0.01	0.01	0.02	0.03	0.05
Frequency [Hz]	1060	1120	1180	1250	1320	1400	1500	1600
Correction [dB]	0.05	0.06	0.06	0.07	0.08	0.09	0.10	0.12
Frequency [Hz]	1700	1800	1900	2000	2120	2240	2360	2500
Correction [dB]	0.13	0.15	0.16	0.18	0.20	0.22	0.25	0.28
Frequency [Hz]	2650	2800	3000	3150	3350	3550	3750	4000
Correction [dB]	0.31	0.35	0.39	0.43	0.49	0.54	0.60	0.68
Frequency [Hz]	4250	4500	4750	5000	5300	5600	6000	6300
Correction [dB]	0.76	0.85	0.93	1.02	1.14	1.25	1.41	1.54
Frequency [Hz]	6700	7100	7500	8000	8500	9000	9500	10000
Correction [dB]	1.70	1.87	2.05	2.26	2.48	2.70	2.92	3.13
Frequency [Hz]	10600	11200	11800	12500	13200	14000	15000	16000
Correction [dB]	3.38	3.62	2.86	4.11	4.35	4.60	4.88	5.11
Frequency [Hz]	17000	18000	19000	20000				
Correction [dB]	5.29	5.42	5.49	5.51				

- Measurement uncertainty 63 Hz – 4 kHz ±0.2 dB;
- Measurement uncertainty 4 kHz – 20 kHz ±0.3 dB.

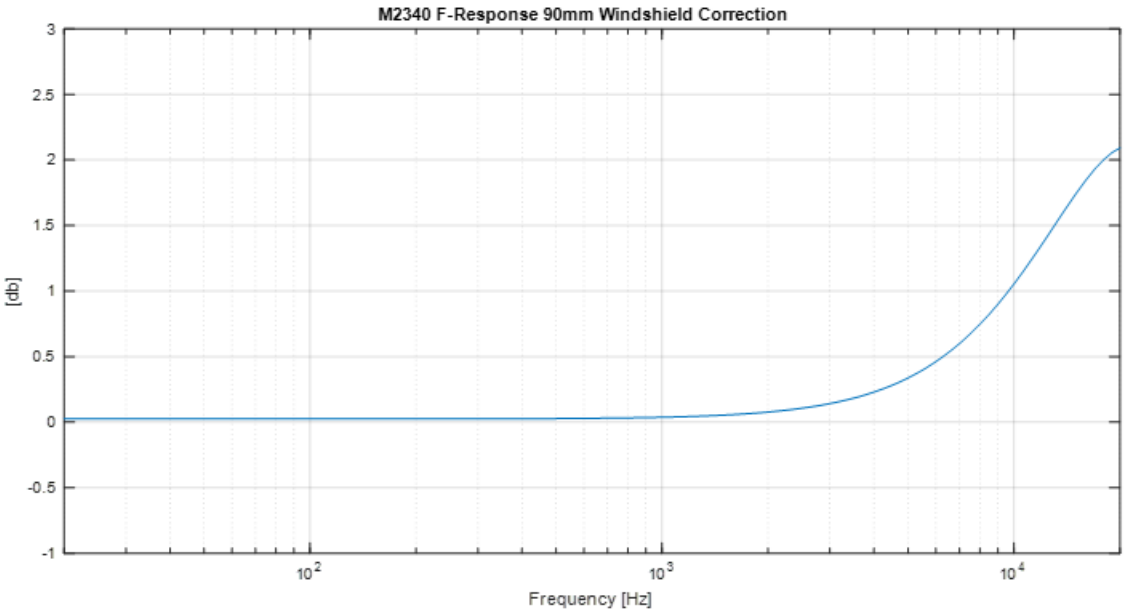
2.6 Windscreen corrections

2.6.1 Windscreen 50 mm correction (1/2")



Frequency [Hz]	200	250	315	400	500	630	800	1000
Correction [dB]	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
Frequency [Hz]	1060	1120	1180	1250	1320	1400	1500	1600
Correction [dB]	-0.03	-0.03	-0.03	-0.03	-0.03	-0.04	-0.04	-0.04
Frequency [Hz]	1700	1800	1900	2000	2120	2240	2360	2500
Correction [dB]	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.05
Frequency [Hz]	2650	2800	3000	3150	3350	3550	3750	4000
Correction [dB]	-0.05	-0.05	-0.05	-0.06	-0.06	-0.06	-0.07	-0.07
Frequency [Hz]	4250	4500	4750	5000	5300	5600	6000	6300
Correction [dB]	-0.07	-0.08	-0.08	-0.09	-0.09	-0.10	-0.10	-0.10
Frequency [Hz]	6700	7100	7500	8000	8500	9000	9500	10000
Correction [dB]	-0.11	-0.11	-0.11	-0.11	-0.11	-0.11	-0.10	-0.08
Frequency [Hz]	10600	11200	11800	12500	13200	14000	15000	16000
Correction [dB]	-0.06	-0.04	0	0.04	0.10	0.17	0.28	0.41
Frequency [Hz]	17000	18000	19000	20000				
Correction [dB]	0.55	0.70	0.86	1.01				

2.6.2 Windscreen 90 mm (1/2")



Frequency [Hz]	200	250	315	400	500	630	800	1000
Correction [dB]	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.04
Frequency [Hz]	1060	1120	1180	1250	1320	1400	1500	1600
Correction [dB]	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.06
Frequency [Hz]	1700	1800	1900	2000	2120	2240	2360	2500
Correction [dB]	0.06	0.07	0.07	0.08	0.08	0.09	0.10	0.11
Frequency [Hz]	2650	2800	3000	3150	3350	3550	3750	4000
Correction [dB]	0.12	0.13	0.14	0.15	0.17	0.19	0.21	0.23
Frequency [Hz]	4250	4500	4750	5000	5300	5600	6000	6300
Correction [dB]	0.25	0.28	0.31	0.34	0.37	0.41	0.46	0.5
Frequency [Hz]	6700	7100	7500	8000	8500	9000	9500	10000
Correction [dB]	0.56	0.61	0.67	0.75	0.82	0.9	0.98	1.05
Frequency [Hz]	10600	11200	11800	12500	13200	14000	15000	16000
Correction [dB]	1.15	1.24	1.33	1.43	1.52	1.63	1.74	1.85
Frequency [Hz]	17000	18000	19000	20000				
Correction [dB]	1.93	2.00	2.06	2.09				

- Measurement uncertainty 63 Hz – 4 kHz ±0.2 dB;
- Measurement uncertainty 4 kHz – 20 kHz ±0.3 dB.

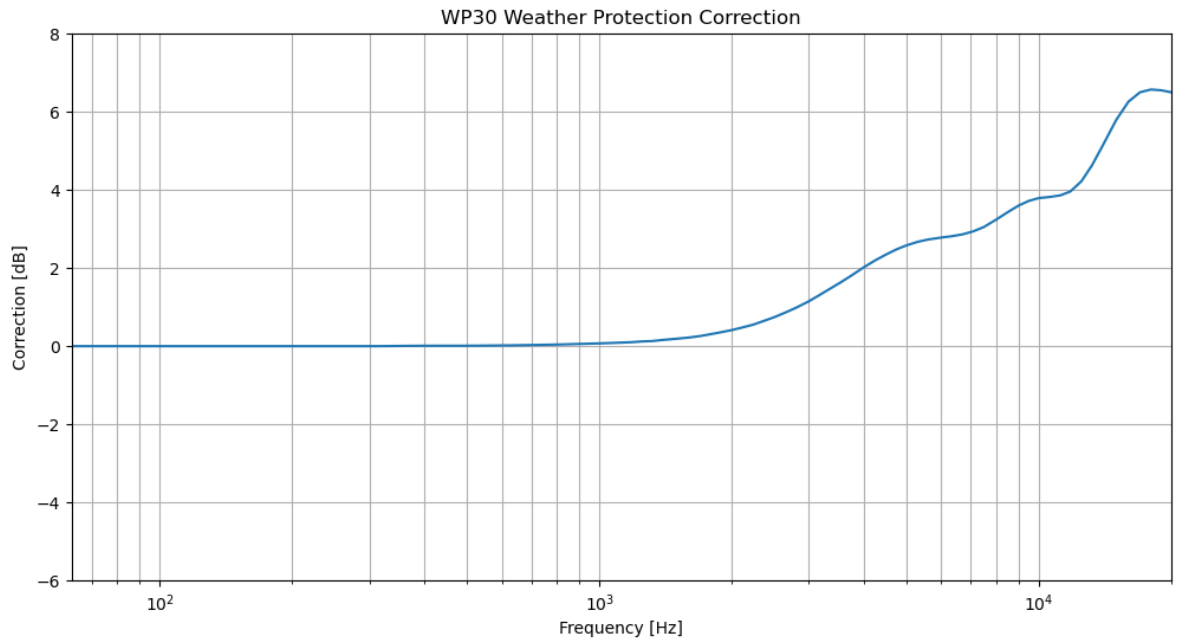
2.7 Correction weather protection WP30-90 and WP40-90

The following correction data apply for the WP30 and WP40 weather protection with either 90 mm windscreen.

2.7.1 WP30-90

The Horizontal sound incidence (community noise) and vertical sound incidence (e.g aicraft noise) corrections for the WP30-90 are presented below.

2.7.1.1 Horizontal sound incidence (community noise)



The data is presented in table format in the Section WP30-90 horizontal sound incidence.

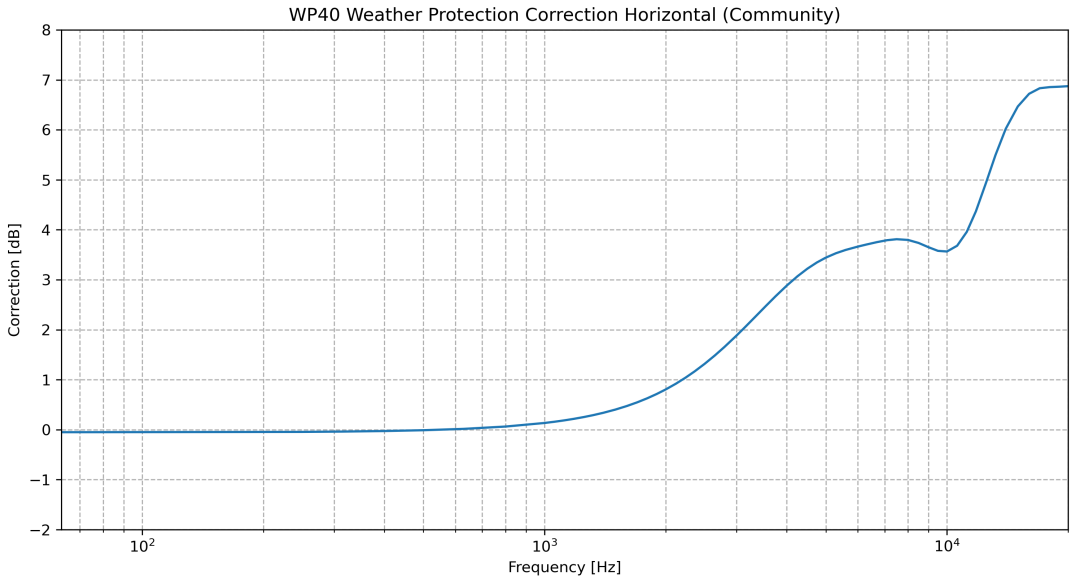
2.7.1.2 Vertical sound incidence (e.g aircraft noise)

For 0° vertical sound incidences (e.g. aircraft noise during overflight) no correction is needed. Please see WP30-90 vertical sound incidence.

2.7.2 WP40-90

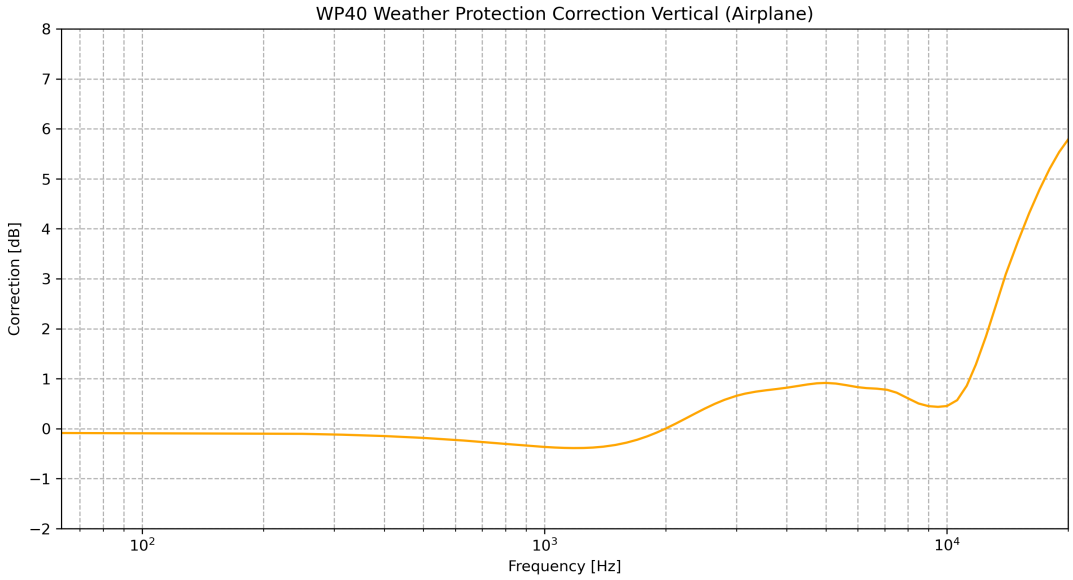
The Horizontal sound incidence (community noise) and vertical sound incidence (e.g aicraft noise) corrections for the WP40-90 are presented below.

2.7.2.1 Horizontal sound incidence (community noise)



The data is presented in table format in the Section WP40-90 horizontal sound incidence.

2.7.2.2 Vertical sound incidence (aircraft noise)



The data is presented in table format in the Section WP40-90 vertical sound incidence.

2.7.3 Frequency Response Corrections

2.7.3.1 90mm Windshield

The corrections for the 90 mm draft shield can be selected directly on the XL3-TA sound level meter. This allows the XL3-TA to correct the effect of the attached windscreen and precisely display the sound pressure level at the measuring point.

The specified measurement uncertainty applies to all measurement and correction values given here. The measurement uncertainty was calculated according to GUM with the coverage factor k = 2 and contains the uncertainty of the method as well as the uncertainty of the test specimen according to IEC 62585.

Nominal Frequency	Actual Frequency	0° Free-field Frequency Response	0° Free-field Correction	Housing Reflection and Microphone Diffraction Correction	Impact of 90 mm Wind Screen	0° Free-field Correction with 90 mm Wind Screen	Measurement Uncertainty
Hz	Hz	dB	dB	dB	dB	dB	dB
63	63.10	0.00	0.00	0.00	0.00	0.00	0.20
125	125.89	0.00	0.00	0.00	0.00	0.00	0.20
250	251.19	0.00	0.00	0.00	-0.02	0.02	0.20
315	316.23	0.00	0.00	0.00	-0.03	0.03	0.20
400	398.11	0.00	0.00	0.00	-0.03	0.03	0.20
500	501.19	0.00	0.00	0.00	-0.03	0.03	0.20
630	630.96	0.00	0.00	0.00	-0.03	0.03	0.20

Nominal Frequency	Actual Frequency	0° Free-field Frequency Response	0° Free-field Correction	Housing Reflection and Microphone Diffraction Correction	Impact of 90 mm Wind Screen	0° Free-field Correction with 90 mm Wind Screen	Measurement Uncertainty
800	794.33	0.00	0.00	0.00	-0.03	0.03	0.20
1000	1000.00	0.00	0.00	0.00	-0.04	0.04	0.20
1060	1059.25	0.00	0.00	0.00	-0.04	0.04	0.20
1120	1122.02	0.00	0.00	0.00	-0.04	0.04	0.20
1180	1188.50	0.00	0.00	0.00	-0.04	0.04	0.20
1250	1258.93	0.00	0.00	0.00	-0.04	0.04	0.20
1320	1333.52	0.00	0.00	0.00	-0.05	0.05	0.20
1400	1412.54	0.00	0.00	0.00	-0.05	0.05	0.20
1500	1496.24	0.00	0.00	0.00	-0.05	0.05	0.20
1600	1584.89	0.00	0.00	0.00	-0.06	0.06	0.20
1700	1678.80	0.00	0.00	0.00	-0.06	0.06	0.20
1800	1778.28	0.00	0.00	0.00	-0.07	0.07	0.20
1900	1883.65	0.00	0.00	0.00	-0.07	0.07	0.20
2000	1995.26	0.00	0.00	0.00	-0.08	0.08	0.20
2120	2113.19	0.00	0.00	0.00	-0.08	0.08	0.20
2240	2238.72	0.00	0.00	0.00	-0.09	0.09	0.20
2360	2371.37	0.00	0.00	0.00	-0.10	0.10	0.20
2500	2511.89	0.00	0.00	0.00	-0.11	0.11	0.20
2650	2660.73	0.00	0.00	0.00	-0.12	0.12	0.20
2800	2818.38	0.00	0.00	0.00	-0.13	0.13	0.20
3000	2985.38	0.00	0.00	0.00	-0.14	0.14	0.20
3150	3162.28	0.00	0.00	0.00	-0.15	0.15	0.20
3350	3349.65	0.00	0.00	0.00	-0.17	0.17	0.20
3550	3548.13	0.00	0.00	0.00	-0.19	0.19	0.20
3750	3758.37	0.00	0.00	0.00	-0.21	0.21	0.20
4000	3981.07	0.00	0.00	0.00	-0.23	0.23	0.20
4250	4216.97	0.00	0.00	0.00	-0.25	0.25	0.30
4500	4466.84	0.00	0.00	0.00	-0.28	0.28	0.30
4750	4731.51	0.00	0.00	0.00	-0.31	0.31	0.30
5000	5011.87	0.00	0.00	0.00	-0.34	0.34	0.30
5300	5308.84	0.00	0.00	0.00	-0.37	0.37	0.30
5600	5623.41	0.00	0.00	0.00	-0.41	0.41	0.30
6000	5956.62	0.00	0.00	0.00	-0.46	0.46	0.30
6300	6309.57	0.00	0.00	0.00	-0.50	0.50	0.30
6700	6683.44	0.00	0.00	0.00	-0.56	0.56	0.30
7100	7079.46	0.00	0.00	0.00	-0.61	0.61	0.30
7500	7498.94	0.00	0.00	0.00	-0.67	0.67	0.30
8000	7943.28	0.00	0.00	0.00	-0.75	0.75	0.30
8500	8413.95	0.00	0.00	0.00	-0.82	0.82	0.30
9000	8912.51	0.00	0.00	0.00	-0.90	0.90	0.30

Nominal Frequency	Actual Frequency	0° Free-field Frequency Response	0° Free-field Correction	Housing Reflection and Microphone Diffraction Correction	Impact of 90 mm Wind Screen	0° Free-field Correction with 90 mm Wind Screen	Measurement Uncertainty
9500	9440.61	0.00	0.00	0.00	-0.98	0.98	0.30
10000	10000.00	0.00	0.00	0.00	-1.05	1.05	0.30
10600	10592.54	0.00	0.00	0.00	-1.15	1.15	0.30
11200	11220.18	0.00	0.00	0.00	-1.24	1.24	0.30
11800	11885.02	0.00	0.00	0.00	-1.33	1.33	0.30
12500	12589.25	0.00	0.00	0.00	-1.43	1.43	0.30
13200	13335.21	0.00	0.00	0.00	-1.52	1.52	0.30
14000	14125.38	0.00	0.00	0.00	-1.63	1.63	0.30
15000	14962.36	0.00	0.00	0.00	-1.74	1.74	0.30
16000	15848.93	0.00	0.00	0.00	-1.85	1.85	0.30
17000	16788.04	0.00	0.00	0.00	-1.93	1.93	0.30
18000	17782.79	0.00	0.00	0.00	-2.00	2.00	0.30
19000	18836.49	0.00	0.00	0.00	-2.06	2.06	0.30
20000	19952.62	0.00	0.00	0.00	-2.09	2.09	0.30

2.7.3.2 WP30-90 horizontal sound incidence

The following table shows the correction data that apply to the WP30 weather protection with horizontal sound incidence with a 90 mm windscreen.

Nominal Frequency	Actual Frequency	0° Free-field Frequency Response	0° Free-field Correction	Housing Reflection and Microphone Diffraction Correction	Impact of WP30 Horizontal sound incidence (community noise)	Free field correction with WP30 Horizontal sound incidence (community noise)	Measurement Uncertainty
Hz	Hz	dB	dB	dB	dB	dB	dB
63	63.10	0.00	0.00	0.00	0.00	0.00	0.20
125	125.89	0.00	0.00	0.00	0.00	0.00	0.20
250	251.19	0.00	0.00	0.00	0.00	0.00	0.20
315	316.23	0.00	0.00	0.00	0.00	0.00	0.20
400	398.11	0.00	0.00	0.00	- 0.01	0.01	0.20
500	501.19	0.00	0.00	0.00	- 0.01	0.01	0.20
630	630.96	0.00	0.00	0.00	- 0.02	0.02	0.20
800	794.33	0.00	0.00	0.00	- 0.04	0.04	0.20
1000	1000.00	0.00	0.00	0.00	- 0.07	0.07	0.20
1060	1059.25	0.00	0.00	0.00	- 0.08	0.08	0.20
1120	1122.02	0.00	0.00	0.00	- 0.09	0.09	0.20
1180	1188.50	0.00	0.00	0.00	- 0.10	0.10	0.20
1250	1258.93	0.00	0.00	0.00	- 0.12	0.12	0.20

Nominal Frequency	Actual Frequency	0° Free-field Frequency Response	0° Free-field Correction	Housing Reflection and Microphone Diffraction Correction	Impact of WP30 Horizontal sound incidence (community noise)	Free field correction with WP30 Horizontal sound incidence (community noise)	Measurement Uncertainty
1320	1333.52	0.00	0.00	0.00	- 0.13	0.13	0.20
1400	1412.54	0.00	0.00	0.00	- 0.16	0.16	0.20
1500	1496.24	0.00	0.00	0.00	- 0.19	0.19	0.20
1600	1584.89	0.00	0.00	0.00	- 0.22	0.22	0.20
1700	1678.80	0.00	0.00	0.00	- 0.26	0.26	0.20
1800	1778.28	0.00	0.00	0.00	- 0.31	0.31	0.20
1900	1883.65	0.00	0.00	0.00	- 0.36	0.36	0.20
2000	1995.26	0.00	0.00	0.00	- 0.41	0.41	0.20
2120	2113.19	0.00	0.00	0.00	- 0.48	0.48	0.20
2240	2238.72	0.00	0.00	0.00	- 0.55	0.55	0.20
2360	2371.37	0.00	0.00	0.00	- 0.64	0.64	0.20
2500	2511.89	0.00	0.00	0.00	- 0.74	0.74	0.20
2650	2660.73	0.00	0.00	0.00	- 0.86	0.86	0.20
2800	2818.38	0.00	0.00	0.00	- 0.98	0.98	0.20
3000	2985.38	0.00	0.00	0.00	- 1.15	1.15	0.20
3150	3162.28	0.00	0.00	0.00	- 1.29	1.29	0.20
3350	3349.65	0.00	0.00	0.00	- 1.47	1.47	0.20
3550	3548.13	0.00	0.00	0.00	- 1.64	1.64	0.20
3750	3758.37	0.00	0.00	0.00	- 1.81	1.81	0.20
4000	3981.07	0.00	0.00	0.00	- 2.02	2.02	0.20
4250	4216.97	0.00	0.00	0.00	- 2.20	2.20	0.30
4500	4466.84	0.00	0.00	0.00	- 2.35	2.35	0.30
4750	4731.51	0.00	0.00	0.00	- 2.48	2.48	0.30
5000	5011.87	0.00	0.00	0.00	- 2.58	2.58	0.30
5300	5308.84	0.00	0.00	0.00	- 2.67	2.67	0.30
5600	5623.41	0.00	0.00	0.00	- 2.73	2.73	0.30
6000	5956.62	0.00	0.00	0.00	- 2.78	2.78	0.30
6300	6309.57	0.00	0.00	0.00	- 2.81	2.81	0.30
6700	6683.44	0.00	0.00	0.00	- 2.86	2.86	0.30
7100	7079.46	0.00	0.00	0.00	- 2.94	2.94	0.30
7500	7498.94	0.00	0.00	0.00	- 3.05	3.05	0.30
8000	7943.28	0.00	0.00	0.00	- 3.24	3.24	0.30
8500	8413.95	0.00	0.00	0.00	- 3.43	3.43	0.30
9000	8912.51	0.00	0.00	0.00	- 3.60	3.60	0.30
9500	9440.61	0.00	0.00	0.00	- 3.72	3.72	0.30
10000	10000.00	0.00	0.00	0.00	- 3.79	3.79	0.30
10600	10592.54	0.00	0.00	0.00	- 3.82	3.82	0.30
11200	11220.18	0.00	0.00	0.00	- 3.86	3.86	0.30

Nominal Frequency	Actual Frequency	0° Free-field Frequency Response	0° Free-field Correction	Housing Reflection and Microphone Diffraction Correction	Impact of WP30 Horizontal sound incidence (community noise)	Free field correction with WP30 Horizontal sound incidence (community noise)	Measurement Uncertainty
11800	11885.02	0.00	0.00	0.00	- 3.96	3.96	0.30
12500	12589.25	0.00	0.00	0.00	- 4.22	4.22	0.30
13200	13335.21	0.00	0.00	0.00	- 4.62	4.62	0.30
14000	14125.38	0.00	0.00	0.00	- 5.15	5.15	0.30
15000	14962.36	0.00	0.00	0.00	- 5.79	5.79	0.30
16000	15848.93	0.00	0.00	0.00	- 6.26	6.26	0.30
17000	16788.04	0.00	0.00	0.00	- 6.50	6.50	0.30
18000	17782.79	0.00	0.00	0.00	- 6.57	6.57	0.30
19000	18836.49	0.00	0.00	0.00	- 6.55	6.55	0.30
20000	19952.62	0.00	0.00	0.00	- 6.50	6.50	0.30

2.7.3.3 WP30-90 vertical sound incidence

The following table shows the correction data that applies to the WP30 weather protection with vertical sound incidence with a 90 mm windscreen.

Nominal Frequency	Actual Frequency	0° Free-field Frequency Response	0° Free-field Correction	Housing Reflection and Microphone Diffraction Correction	Impact of WP30 Vertical sound incidence (Aircraft noise)	Free field correction with WP30 Vertical sound incidence (Aircraft noise)	Measurement Uncertainty
Hz	Hz	dB	dB	dB	dB	dB	dB
63	63.10	0.00	0.00	0.00	0.00	0.00	0.20
125	125.89	0.00	0.00	0.00	0.00	0.00	0.20
250	251.19	0.00	0.00	0.00	0.00	0.00	0.20
315	316.23	0.00	0.00	0.00	0.00	0.00	0.20
400	398.11	0.00	0.00	0.00	0.00	0.00	0.20
500	501.19	0.00	0.00	0.00	0.00	0.00	0.20
630	630.96	0.00	0.00	0.00	0.00	0.00	0.20
800	794.33	0.00	0.00	0.00	0.00	0.00	0.20
1000	1000.00	0.00	0.00	0.00	0.00	0.00	0.20
1060	1059.25	0.00	0.00	0.00	0.00	0.00	0.20
1120	1122.02	0.00	0.00	0.00	0.00	0.00	0.20
1180	1188.50	0.00	0.00	0.00	0.00	0.00	0.20
1250	1258.93	0.00	0.00	0.00	0.00	0.00	0.20
1320	1333.52	0.00	0.00	0.00	0.00	0.00	0.20
1400	1412.54	0.00	0.00	0.00	0.00	0.00	0.20

Nominal Frequency	Actual Frequency	0° Free-field Frequency Response	0° Free-field Correction	Housing Reflection and Microphone Diffraction Correction	Impact of WP30 Vertical sound incidence (Aircraft noise)	Free field correction with WP30 Vertical sound incidence (Aircraft noise)	Measurement Uncertainty
1500	1496.24	0.00	0.00	0.00	0.00	0.00	0.20
1600	1584.89	0.00	0.00	0.00	0.00	0.00	0.20
1700	1678.80	0.00	0.00	0.00	0.00	0.00	0.20
1800	1778.28	0.00	0.00	0.00	0.00	0.00	0.20
1900	1883.65	0.00	0.00	0.00	0.00	0.00	0.20
2000	1995.26	0.00	0.00	0.00	0.00	0.00	0.20
2120	2113.19	0.00	0.00	0.00	0.00	0.00	0.20
2240	2238.72	0.00	0.00	0.00	0.00	0.00	0.20
2360	2371.37	0.00	0.00	0.00	0.00	0.00	0.20
2500	2511.89	0.00	0.00	0.00	0.00	0.00	0.20
2650	2660.73	0.00	0.00	0.00	0.00	0.00	0.20
2800	2818.38	0.00	0.00	0.00	0.00	0.00	0.20
3000	2985.38	0.00	0.00	0.00	0.00	0.00	0.20
3150	3162.28	0.00	0.00	0.00	0.00	0.00	0.20
3350	3349.65	0.00	0.00	0.00	0.00	0.00	0.20
3550	3548.13	0.00	0.00	0.00	0.00	0.00	0.20
3750	3758.37	0.00	0.00	0.00	0.00	0.00	0.20
4000	3981.07	0.00	0.00	0.00	0.00	0.00	0.20
4250	4216.97	0.00	0.00	0.00	0.00	0.00	0.30
4500	4466.84	0.00	0.00	0.00	0.00	0.00	0.30
4750	4731.51	0.00	0.00	0.00	0.00	0.00	0.30
5000	5011.87	0.00	0.00	0.00	0.00	0.00	0.30
5300	5308.84	0.00	0.00	0.00	0.00	0.00	0.30
5600	5623.41	0.00	0.00	0.00	0.00	0.00	0.30
6000	5956.62	0.00	0.00	0.00	0.00	0.00	0.30
6300	6309.57	0.00	0.00	0.00	0.00	0.00	0.30
6700	6683.44	0.00	0.00	0.00	0.00	0.00	0.30
7100	7079.46	0.00	0.00	0.00	0.00	0.00	0.30
7500	7498.94	0.00	0.00	0.00	0.00	0.00	0.30
8000	7943.28	0.00	0.00	0.00	0.00	0.00	0.30
8500	8413.95	0.00	0.00	0.00	0.00	0.00	0.30
9000	8912.51	0.00	0.00	0.00	0.00	0.00	0.30
9500	9440.61	0.00	0.00	0.00	0.00	0.00	0.30
10000	10000.00	0.00	0.00	0.00	0.00	0.00	0.30
10600	10592.54	0.00	0.00	0.00	0.00	0.00	0.30
11200	11220.18	0.00	0.00	0.00	0.00	0.00	0.30
11800	11885.02	0.00	0.00	0.00	0.00	0.00	0.30
12500	12589.25	0.00	0.00	0.00	0.00	0.00	0.30

Nominal Frequency	Actual Frequency	0° Free-field Frequency Response	0° Free-field Correction	Housing Reflection and Microphone Diffraction Correction	Impact of WP30 Vertical sound incidence (Aircraft noise)	Free field correction with WP30 Vertical sound incidence (Aircraft noise)	Measurement Uncertainty
13200	13335.21	0.00	0.00	0.00	0.00	0.00	0.30
14000	14125.38	0.00	0.00	0.00	0.00	0.00	0.30
15000	14962.36	0.00	0.00	0.00	0.00	0.00	0.30
16000	15848.93	0.00	0.00	0.00	0.00	0.00	0.30
17000	16788.04	0.00	0.00	0.00	0.00	0.00	0.30
18000	17782.79	0.00	0.00	0.00	0.00	0.00	0.30
19000	18836.49	0.00	0.00	0.00	0.00	0.00	0.30
20000	19952.62	0.00	0.00	0.00	0.00	0.00	0.30

2.7.3.4 WP40-90 horizontal sound incidence

The following table shows the correction data that apply to the WP40 weather protection with horizontal sound incidence with a 90 mm windscreen.

Nominal Frequency	Actual Frequency	0° Free-field Frequency Response	0° Free-field Correction	Housing Reflection and Microphone Diffraction Correction	Impact of WP40 Horizontal sound incidence (community noise)	Free field correction with WP40 Horizontal sound incidence (community noise)	Measurement Uncertainty
Hz	Hz	dB	dB	dB	dB	dB	dB
63	63.10	0.00	0.00	0.00	0.00	0.00	0.20
125	125.89	0.00	0.00	0.00	0.00	0.00	0.20
250	251.19	0.00	0.00	0.00	0.04	-0.04	0.20
315	316.23	0.00	0.00	0.00	0.04	-0.04	0.20
400	398.11	0.00	0.00	0.00	0.03	-0.03	0.20
500	501.19	0.00	0.00	0.00	0.01	-0.01	0.20
630	630.96	0.00	0.00	0.00	- 0.02	0.02	0.20
800	794.33	0.00	0.00	0.00	- 0.06	0.06	0.20
1000	1000.00	0.00	0.00	0.00	- 0.13	0.13	0.20
1060	1059.25	0.00	0.00	0.00	- 0.16	0.16	0.20
1120	1122.02	0.00	0.00	0.00	- 0.19	0.19	0.20
1180	1188.50	0.00	0.00	0.00	- 0.22	0.22	0.20
1250	1258.93	0.00	0.00	0.00	-0.25	0.25	0.20
1320	1333.52	0.00	0.00	0.00	- 0.29	0.29	0.20
1400	1412.54	0.00	0.00	0.00	- 0.34	0.34	0.20
1500	1496.24	0.00	0.00	0.00	- 0.40	0.40	0.20
1600	1584.89	0.00	0.00	0.00	- 0.47	0.47	0.20

Nominal Frequency	Actual Frequency	0° Free-field Frequency Response	0° Free-field Correction	Housing Reflection and Microphone Diffraction Correction	Impact of WP40 Horizontal sound incidence (community noise)	Free field correction with WP40 Horizontal sound incidence (community noise)	Measurement Uncertainty
1700	1678.80	0.00	0.00	0.00	- 0.55	0.55	0.20
1800	1778.28	0.00	0.00	0.00	-0.63	0.63	0.20
1900	1883.65	0.00	0.00	0.00	- 0.71	0.71	0.20
2000	1995.26	0.00	0.00	0.00	- 0.80	0.80	0.20
2120	2113.19	0.00	0.00	0.00	- 0.92	0.92	0.20
2240	2238.72	0.00	0.00	0.00	- 1.04	1.04	0.20
2360	2371.37	0.00	0.00	0.00	- 1.17	1.17	0.20
2500	2511.89	0.00	0.00	0.00	- 1.32	1.32	0.20
2650	2660.73	0.00	0.00	0.00	- 1.49	1.49	0.20
2800	2818.38	0.00	0.00	0.00	- 1.66	1.66	0.20
3000	2985.38	0.00	0.00	0.00	- 1.88	1.88	0.20
3150	3162.28	0.00	0.00	0.00	- 2.05	2.05	0.20
3350	3349.65	0.00	0.00	0.00	- 2.27	2.27	0.20
3550	3548.13	0.00	0.00	0.00	- 2.48	2.48	0.20
3750	3758.37	0.00	0.00	0.00	-2.67	2.67	0.20
4000	3981.07	0.00	0.00	0.00	-2.88	2.88	0.20
4250	4216.97	0.00	0.00	0.00	-3.07	3.07	0.30
4500	4466.84	0.00	0.00	0.00	-3.22	3.22	0.30
4750	4731.51	0.00	0.00	0.00	-3.35	3.35	0.30
5000	5011.87	0.00	0.00	0.00	-3.44	3.44	0.30
5300	5308.84	0.00	0.00	0.00	-3.53	3.53	0.30
5600	5623.41	0.00	0.00	0.00	-3.60	3.60	0.30
6000	5956.62	0.00	0.00	0.00	-3.66	3.66	0.30
6300	6309.57	0.00	0.00	0.00	-3.70	3.70	0.30
6700	6683.44	0.00	0.00	0.00	-3.75	3.75	0.30
7100	7079.46	0.00	0.00	0.00	-3.79	3.79	0.30
7500	7498.94	0.00	0.00	0.00	-3.81	3.81	0.30
8000	7943.28	0.00	0.00	0.00	-3.80	3.80	0.30
8500	8413.95	0.00	0.00	0.00	-3.74	3.74	0.30
9000	8912.51	0.00	0.00	0.00	-3.65	3.65	0.30
9500	9440.61	0.00	0.00	0.00	-3.58	3.58	0.30
10000	10000.00	0.00	0.00	0.00	-3.57	3.57	0.30
10600	10592.54	0.00	0.00	0.00	- 3.68	3.68	0.30
11200	11220.18	0.00	0.00	0.00	-3.96	3.96	0.30
11800	11885.02	0.00	0.00	0.00	-4.37	4.37	0.30
12500	12589.25	0.00	0.00	0.00	-4.94	4.94	0.30
13200	13335.21	0.00	0.00	0.00	-5.49	5.49	0.30
14000	14125.38	0.00	0.00	0.00	-6.02	6.02	0.30

Nominal Frequency	Actual Frequency	0° Free-field Frequency Response	0° Free-field Correction	Housing Reflection and Microphone Diffraction Correction	Impact of WP40 Horizontal sound incidence (community noise)	Free field correction with WP40 Horizontal sound incidence (community noise)	Measurement Uncertainty
15000	14962.36	0.00	0.00	0.00	-6.47	6.47	0.30
16000	15848.93	0.00	0.00	0.00	-6.72	6.72	0.30
17000	16788.04	0.00	0.00	0.00	-6.83	6.83	0.30
18000	17782.79	0.00	0.00	0.00	- 6.85	6.85	0.30
19000	18836.49	0.00	0.00	0.00	- 6.86	6.86	0.30
20000	19952.62	0.00	0.00	0.00	- 6.87	6.87	0.30

2.7.3.5 WP40-90 vertical sound incidence

The following table shows the correction data that applies to the WP40 weather protection with vertical sound incidence with a 90 mm windscreen.

Nominal Frequency	Actual Frequency	0° Free-field Frequency Response	0° Free-field Correction	Housing Reflection and Microphone Diffraction Correction	Impact of WP40 Vertical sound incidence (Aircraft noise)	Free field correction with WP40 Vertical sound incidence (Aircraft noise)	Measurement Uncertainty
Hz	Hz	dB	dB	dB	dB	dB	dB
63	63.10	0.00	0.00	0.00	0.00	0.00	0.20
125	125.89	0.00	0.00	0.00	0.00	0.00	0.20
250	251.19	0.00	0.00	0.00	0.10	-0.10	0.20
315	316.23	0.00	0.00	0.00	0.12	-0.12	0.20
400	398.11	0.00	0.00	0.00	0.15	-0.15	0.20
500	501.19	0.00	0.00	0.00	0.18	-0.18	0.20
630	630.96	0.00	0.00	0.00	0.24	-0.24	0.20
800	794.33	0.00	0.00	0.00	0.31	-0.31	0.20
1000	1000.00	0.00	0.00	0.00	0.37	-0.37	0.20
1060	1059.25	0.00	0.00	0.00	0.38	-0.38	0.20
1120	1122.02	0.00	0.00	0.00	0.39	-0.39	0.20
1180	1188.50	0.00	0.00	0.00	0.39	-0.39	0.20
1250	1258.93	0.00	0.00	0.00	0.39	-0.39	0.20
1320	1333.52	0.00	0.00	0.00	0.38	-0.38	0.20
1400	1412.54	0.00	0.00	0.00	0.36	-0.36	0.20
1500	1496.24	0.00	0.00	0.00	0.33	-0.33	0.20
1600	1584.89	0.00	0.00	0.00	0.28	-0.28	0.20
1700	1678.80	0.00	0.00	0.00	0.22	-0.22	0.20
1800	1778.28	0.00	0.00	0.00	0.15	-0.15	0.20

Nominal Frequency	Actual Frequency	0° Free-field Frequency Response	0° Free-field Correction	Housing Reflection and Microphone Diffraction Correction	Impact of WP40 Vertical sound incidence (Aircraft noise)	Free field correction with WP40 Vertical sound incidence (Aircraft noise)	Measurement Uncertainty
1900	1883.65	0.00	0.00	0.00	0.08	-0.08	0.20
2000	1995.26	0.00	0.00	0.00	- 0.00	0.00	0.20
2120	2113.19	0.00	0.00	0.00	- 0.10	0.10	0.20
2240	2238.72	0.00	0.00	0.00	- 0.20	0.20	0.20
2360	2371.37	0.00	0.00	0.00	- 0.30	0.30	0.20
2500	2511.89	0.00	0.00	0.00	- 0.40	0.40	0.20
2650	2660.73	0.00	0.00	0.00	- 0.50	0.50	0.20
2800	2818.38	0.00	0.00	0.00	- 0.58	0.58	0.20
3000	2985.38	0.00	0.00	0.00	- 0.66	0.66	0.20
3150	3162.28	0.00	0.00	0.00	- 0.70	0.70	0.20
3350	3349.65	0.00	0.00	0.00	- 0.74	0.74	0.20
3550	3548.13	0.00	0.00	0.00	- 0.77	0.77	0.20
3750	3758.37	0.00	0.00	0.00	- 0.79	0.79	0.20
4000	3981.07	0.00	0.00	0.00	- 0.82	0.82	0.20
4250	4216.97	0.00	0.00	0.00	- 0.85	0.85	0.30
4500	4466.84	0.00	0.00	0.00	- 0.88	0.88	0.30
4750	4731.51	0.00	0.00	0.00	- 0.91	0.91	0.30
5000	5011.87	0.00	0.00	0.00	- 0.92	0.92	0.30
5300	5308.84	0.00	0.00	0.00	- 0.90	0.90	0.30
5600	5623.41	0.00	0.00	0.00	- 0.87	0.87	0.30
6000	5956.62	0.00	0.00	0.00	- 0.83	0.83	0.30
6300	6309.57	0.00	0.00	0.00	- 0.81	0.81	0.30
6700	6683.44	0.00	0.00	0.00	- 0.80	0.80	0.30
7100	7079.46	0.00	0.00	0.00	- 0.78	0.78	0.30
7500	7498.94	0.00	0.00	0.00	- 0.72	0.72	0.30
8000	7943.28	0.00	0.00	0.00	- 0.61	0.61	0.30
8500	8413.95	0.00	0.00	0.00	- 0.50	0.50	0.30
9000	8912.51	0.00	0.00	0.00	- 0.45	0.45	0.30
9500	9440.61	0.00	0.00	0.00	- 0.44	0.44	0.30
10000	10000.00	0.00	0.00	0.00	- 0.45	0.45	0.30
10600	10592.54	0.00	0.00	0.00	- 0.57	0.57	0.30
11200	11220.18	0.00	0.00	0.00	- 0.86	0.86	0.30
11800	11885.02	0.00	0.00	0.00	- 1.28	1.28	0.30
12500	12589.25	0.00	0.00	0.00	- 1.85	1.85	0.30
13200	13335.21	0.00	0.00	0.00	- 2.44	2.44	0.30
14000	14125.38	0.00	0.00	0.00	- 3.09	3.09	0.30
15000	14962.36	0.00	0.00	0.00	- 3.74	3.74	0.30
16000	15848.93	0.00	0.00	0.00	- 4.31	4.31	0.30

Nominal Frequency	Actual Frequency	0° Free-field Frequency Response	0° Free-field Correction	Housing Reflection and Microphone Diffraction Correction	Impact of WP40 Vertical sound incidence (Aircraft noise)	Free field correction with WP40 Vertical sound incidence (Aircraft noise)	Measurement Uncertainty
17000	16788.04	0.00	0.00	0.00	- 4.79	4.79	0.30
18000	17782.79	0.00	0.00	0.00	- 5.20	5.20	0.30
19000	18836.49	0.00	0.00	0.00	- 5.53	5.53	0.30
20000	19952.62	0.00	0.00	0.00	- 5.79	5.79	0.30

2.8 Frequency weighting filter

Rated frequency [Hz]	Frequency weighting [dB]		
	A	C	Z
10	–70.4	–14.3	0.0
12.5	–63.4	–11.2	0.0
16	–56.7	–8.5	0.0
20	–50.5	–6.2	0.0
25	–44.7	–4.4	0.0
31.5	–39.4	–3.0	0.0
40	–34.6	–2.0	0.0
50	–30.2	–1.3	0.0
63	–26.2	–0.8	0.0
80	–22.5	–0.5	0.0
100	–19.1	–0.3	0.0
125	–16.1	–0.2	0.0
160	–13.4	–0.1	0.0
200	–10.9	0.0	0.0
250	–8.6	0.0	0.0
315	–6.6	0.0	0.0
400	–4.8	0.0	0.0
500	–3.2	0.0	0.0
630	–1.9	0.0	0.0
800	–0.8	0.0	0.0
1000	0.0	0.0	0.0
1250	0.6	0.0	0.0

Rated frequency [Hz]	Frequency weighting [dB]		
	A	C	Z
1600	1.0	–0.1	0.0
2000	1.2	–0.2	0.0
2500	1.3	–0.3	0.0
3150	1.2	–0.5	0.0
4000	1.0	–0.8	0.0
5000	0.5	–1.3	0.0
6300	–0.1	–2.0	0.0
8000	–1.1	–3.0	0.0
10000	–2.5	–4.4	0.0
12500	–4.3	–6.2	0.0
16000	–6.6	–8.5	0.0
20000	–9.3	–11.2	0.0

2.9 Level linearity of broadband levels

The initial values ("beginning at") for the level linearity test according to IEC61672 can be seen in the following tables. Sref = 42 mV/Pa* applies to all specifications.

2.9.1 Level range with M2340

Frequency	dB					
	LAT*	LCT*	LZT*	LAeqT*	LAE* (t_{int}= 10 s)	LCpeak*
31.5 Hz	from 25 to 98 beginning at 94	from 28 to 135 beginning at 114	from 31 to 138 beginning at 114	from 25 to 98 beginning at 94	from 35 to 108 beginning at 94	----
1 kHz	from 25 to 138 beginning at 114	from 28 to 138 beginning at 114	from 31 to 138 beginning at 114	from 25 to 138 beginning at 114	from 35 to 148 beginning at 124	from 41 to 141
4 kHz	from 25 to 139 beginning at 114	from 28 to 137 beginning at 114	from 31 to 138 beginning at 114	from 25 to 139 beginning at 114	from 35 to 149 beginning at 124	----
8 kHz	from 25 to 136 beginning at 114	from 28 to 135 beginning at 114	from 31 to 138 beginning at 114	from 25 to 136 beginning at 114	from 35 to 146 beginning at 124	----

Frequency	dB					
	LAT*	LCT*	LZT*	LAeqT*	LAE* (t_{int}= 10 s)	LCpeak*
12.5 kHz	from 25 to 133 beginning at 114	from 28 to 131 beginning at 114	from 31 to 138 beginning at 114	from 25 to 133 beginning at 114	from 35 to 143 beginning at 124	----

* If the sensitivity Sx deviates from the given data, a correction value of 20*log(Sref/Sx) has to be added.

Example: Sx = 45 mV/Pa –> correction value = 20*log(42/45) = –0.6 dB

2.9.2 Level range with M2230

Frequency	dB					
	LAT*	LCT*	LZT*	LAeqT*	LAE* (t_{int} = 10 s)	LCpeak*
31.5 Hz	from 24 to 98 beginning at 94	from 27 to 134 beginning at 114	from 30 to 137 beginning at 114	from 24 to 98 beginning at 94	from 34 to 108 beginning at 94	----
1 kHz	from 24 to 137 beginning at 114	from 27 to 137 beginning at 114	from 30 to 137 beginning at 114	from 24 to 137 beginning at 114	from 34 to 147 beginning at 124	from 41 to 140
4 kHz	from 24 to 138 beginning at 114	from 27 to 136 beginning at 114	from 30 to 137 beginning at 114	from 24 to 138 beginning at 114	from 34 to 148 beginning at 124	----
8 kHz	from 24 to 136 beginning at 114	from 27 to 134 beginning at 114	from 30 to 137 beginning at 114	from 24 to 136 beginning at 114	from 34 to 146 beginning at 124	----
12.5 kHz	from 24 to 133 beginning at 114	from 27 to 131 beginning at 114	from 30 to 137 beginning at 114	from 24 to 133 beginning at 114	from 34 to 143 beginning at 124	----

Sound levels that continuously exceed the specified ranges and overdrive the microphone amplifier can, in extreme cases, result in the display of measured values below the real sound level.

2.9.3 Intrinsic noise with microphone M2340

Frequency weighting	Intrinsic noise @ S = 42 mV/Pa	
	terminated with microphone preamplifier	with complete microphone M2340
A	12	18
C	15	21
Z	22	24

2.9.4 Intrinsic noise with microphone M2230

Frequency weighting	Intrinsic noise @ S = 42 mV/Pa	
	terminated with microphone preamplifier	with complete microphone M2230
A	11	17
C	14	20
Z	22	23

2.9.5 Level linearity for Octave band level

For IEC 61260; for all specifications Sref = 42 mV/Pa*.

Rated frequency [Hz]	Measuring range M2340 [dBSPL]		Measuring range M2230 [dBSPL]	
	from	to	from	to
8	24	137	24	137
16	21	137	21	137
31.5	17	137	17	137
63	15	137	15	137
125	14	137	14	137
250	13	137	13	137
500	13	137	13	137
1000	15	137	15	137
2000	17	137	17	137
4000	19	137	19	137
8000	19	137	19	137
16000	18	137	18	137

The basic sampling rate of the filters is 96 kHz

* If the sensitivity Sx differs, a correction value of 20*log(Sref/Sx) must be added to the specified values. Example: Sx = 45 mV/Pa –> correction value = 20*log(42/45) = –0.6 dB

2.9.6 Level linearity for 1/3rd Octave band level

for IEC 61260; for all specifications Sref = 42 mV/Pa*.

Rated frequency [Hz]	Measuring range M2340 [dBSPL]		Measuring range M2230 [dBSPL]	
	from	to	from	to
6.3	20	137	20	137
8	19	137	19	137
10	18	137	18	137
12.5	17	137	17	137
16	16	137	16	137
20	15	137	15	137
25	13	137	13	137
31.5	12	137	12	137
40	11	137	11	137
50	11	137	11	137
63	10	137	10	137
80	9	137	9	137
100	9	137	9	137
125	8	137	8	137
160	8	137	8	137
200	8	137	8	137
250	8	137	8	137
315	8	137	8	137
400	8	137	8	137
500	8	137	8	137
630	9	137	9	137
800	9	137	9	137
1000	10	137	10	137
1250	11	137	11	137
1600	11	137	11	137
2000	13	137	13	137
2500	13	137	13	137
3150	14	137	14	137
4000	14	137	14	137
5000	15	137	15	137
6300	15	137	15	137
8000	15	137	15	137
10000	15	137	15	137

Rated frequency [Hz]	Measuring range M2340 [dBSPL]		Measuring range M2230 [dBSPL]	
	from	to	from	to
12500	14	137	14	137
16000	13	137	13	137
20000	13	137	13	137