

XL3 Acoustic Analyzer

All specifications are according to the IEC61672 standard.
Other standards are listed the corresponding specifications.

| Sound Level Meter | |
|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Certified Product Configurations Class 1 (pending) | <ul style="list-style-type: none"> • XL3 + M2230 Microphone • XL3 + M2340 Microphone <p>These configurations form an integrating sound level meter with type approval in accordance with class 1 requirements of IEC 61672 and ANSI S1.4 for operation with the microphone attached, the microphone detached using the ASD cable and the optional Weather Protection WP30.</p> <p>The Type Approval Option enables the operation of the sound level meter with the certified firmware.</p> |
| Product Configurations Class 1 | <ul style="list-style-type: none"> • XL3 with M2211 or M2215 microphone <p>Class 1 frequency response in accordance with IEC 61672 and ANSI S1.4</p> |
| Product Configurations Class 2 | <ul style="list-style-type: none"> • XL3 with M4261 microphone <p>Class 2 in accordance with IEC 61672 and ANSI S1.4</p> |

Conforms with standards

- IEC 61672:2013, IEC 61672:2003, IEC 61260:2014, IEC 61260:2003, IEC 60651, IEC 60804, IEC 61183
- SMPTE ST 202:2010, ISO 2969:2015
- China: GB/T 3785:2010, GB/T 3241
- Germany: DIN 15905-5, DIN 45657:2014, DIN 45657:2005, DIN 45645-1, DIN 45645-2
- Japan: JIS C1509-1:2005, JIS C 1513 class 1, JIS C 1514 class 0
- Switzerland: V-NISSG
- UK: BS 4142:2014, BS 5969, BS 6698
- US: ANSI S1.4:2014, ANSI S1.43, ANSI S1.11:2014, ANSI/ASA S12.60
- International IEC standards are adopted as European standards and the letters IEC are replaced by EN. XL3 conforms to these EN standards.
- WELL Buildings, LEED Green Building
- FGI Facility Guidelines Institute

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| Level Details | <ul style="list-style-type: none"> • Sound pressure levels live, Lmin, Lmax, Lpeak, Leq, Lp • Gliding LAeq_gx and LCeq_gx with selectable time window x from one second to one hour (= sliding Lyeq_gx with y= A or C) • Clock-Impulse Maximum Level (TaktMax) in accordance with DIN 45645-1 and DIN 45657 • Level difference LCeq-LAeq, LAFT5eq-LAeq • Frequency weighting: A, C, Z (simultaneous) • Time weighting: (simultaneous) <ul style="list-style-type: none"> » Fast, Slow » Impulse (optional with Extended Noise Measurement Option) • All measurement results simultaneously available • Single measurement range • Level resolution: 0.1 dB • Logging: 1 second • Correction value measurement wizard based on LAeq, LCeq and LCpeak • Noise exposure level LEX with post-processing • Logging all data or subsets in selectable intervals • Selectable level limits • Voice notes (planned) • Measurement bandwidth (-3dB): 4.4 Hz - 23.0 kHz • Internal noise: 1.3 µV A-Weighted |
| Stabilization Time | < 10 seconds |
| Integration Time | <ul style="list-style-type: none"> • Minimum: 1 second • Maximum: 100 hours minus 1 second |

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| Audio Recording | <ul style="list-style-type: none"> • Default <ul style="list-style-type: none"> » Recording of compressed wav-files (ADPCM - 4 bit, 12 or 24 kHz) » a new wav-file starts every 12 hours (max. wav-file size 512 MB) » Bandwidth: 2.0 Hz - 10.2 kHz • Optional: Extended Noise Measurement Option <ul style="list-style-type: none"> » Recording of linear wav-files » Resolution 24, 32 bit @ 12, 24, 48, 96 kHz » a new wav-file starts every 1 hours (max. wav-file size 512 MB) » Bandwidth: 2.0 Hz - 23.6 kHz • Audio files include meta data (scaling, time, ...) in Broadcast Wave Format BWF according to EBU TECH 3285 |
| Measurement Ranges with different microphones | <ul style="list-style-type: none"> • XL3+M2230: 17 dB(A) - 137 dB • XL3+M2340: 18 dB(A) - 138 dB • XL3+M2211: 21 dB(A) - 144 dB • XL3+M2215: 25 dB(A) - 153 dB • XL3+M2914: 6.5 dB(A) - 100 dB • XL3+M4261: 27 dB(A) - 146 dB @ typical microphone sensitivity |
| Linear Measurement Range acc. IEC61672 / ANSI S1.4 | <ul style="list-style-type: none"> • XL3+M2230: 24 dB(A) - 137 dB, 27 dB(C) - 137 dB • XL3+M2340: 25 dB(A) - 138 dB, 28 dB(C) - 138 dB • XL3+M2211: 29 dB(A) - 144 dB • XL3+M2215: 33 dB(A) - 153 dB • XL3+M2914: 13.5 dB(A) - 100 dB • XL3+M4261: 33 dB(A) - 146 dB @ typical microphone sensitivity |

Residual noise in [dB]
@ S =
42 mV/Pa
of XL3
without measure-
ment
microphone

| Frequency weighting | L _{eq} | L _{peak} |
|---------------------|-----------------|-------------------|
| A | 4 | 17 |
| C | 3 | 16 |
| Z | 7 | 20 |

Acoustic Analyzer

Spectrum

- Sound pressure levels live, L_{eq}, L_{min}, L_{max}
- 1/1 octave band display: 8 Hz - 16 kHz
- 1/3 octave band display: 6.3 Hz - 20 kHz
- Zoomable X-Axis for reduced number of frequency bands
- Broadband levels A/Z simultaneously
- Level resolution: 0.1 dB
- Logging: 1 second
- Band pass filters (base 10) conform with class 1 of IEC 61260:2014 and ANSI S1.11-2014
 - » 1/1 octave spectrum: > 16 Hz band
 - » 1/3 octave spectrum: > 16 Hz band

Reverberation Time RT

- Conforms with ISO 3382 and ASTM E2235
- 1/1 octave band display: 63 Hz - 8 kHz
- 1/3 octave bands results from 50 Hz - 10 kHz (optional with Room Acoustics Measurement Option)
- Measurement parameters: T20 or T30
- Automatic position averaging of decays
- Range: 10 ms - 30 seconds
- Minimum reverberation time (typical)

| Frequency [Hz] | @ 1/1 [s] | @ 1/3 [s] |
|----------------|-----------|-----------|
| 6.3 - 10 | 0.33 | < 0.80 |
| 12.5 - 20 | 0.17 | < 0.50 |
| 25 - 40 | 0.09 | < 0.30 |
| 50 - 80 | 0.05 | < 0.15 |
| 100 - 500 | < 0.03 | < 0.10 |
| > 500 | < 0.01 | < 0.01 |

- Measurement based on Schroeder backward integration
- Test signal: Impulse source or interrupted pink noise generated by the MR-PRO, MR2 or DS3

API Pro-
gramming
(optional)

- Control, configuration & data retrieval
- Noise data and audio streaming (planned)
- Weather and state-of-health data (planned)

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| Functions of Extended Noise Measurement Option (optional) | <ul style="list-style-type: none"> • Sound Level Meter / Spectrum function <ul style="list-style-type: none"> » Recording of linear wav-files (24, 32 bit @ 12, 24, 48, 96 kHz); a new wav-file starts every 1 hour | | |
| | fs [kHz] | Resolution | GB/day |
| | 96 | 32 | 30.9 |
| | 96 | 24 | 23.2 |
| | 48 | 32 | 15.4 |
| | 48 | 24 | 11.6 |
| | 24 | 32 | 7.7 |
| | 24 | 24 | 5.8 |
| | 24 | 4 | 1.0 |
| | 12 | 32 | 3.9 |
| | 12 | 24 | 2.9 |
| | 12 | 4 | 0.5 |
| <ul style="list-style-type: none"> • Percentiles for wide band, 1/1 and 1/3 octave spectrum <ul style="list-style-type: none"> » Flexible setting from 0.1 % to 99.9 % » Sampling: every 1.3 ms » Broadband: in 0.1 dB wide classes, based on sampling L_{xy} ($x = A, C$ or Z, $y = F, S$ or EQ_1) » 1/1 and 1/3 octave spectrum: in 1.0 dB wide classes, based on L_{xy} ($x = A, C$ or Z, $y = F$ or S) » Dynamic range: 140 dB | | | |

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| | <ul style="list-style-type: none"> • Sound Exposure Level LAE • 100 ms logging (broadband & spectrum) • Time weighting: Impulse (L_{xI}, L_{xIeq} with $x = A, C, Z$) • Level difference $L_{Aeq} - L_{Aeq}$ • Event-triggered audio and data recording (planned) |
| Functions of Extended Room Acoustics Measurement Option (optional) | <ul style="list-style-type: none"> • Reverberation time function <ul style="list-style-type: none"> » Reverberation time in 1/3 octave resolution » Early Decay Time EDT, T15 » T30, T20, T15, EDT simultaneously » Adjustable trigger level » Automatic room average of multiple positions » Audio Recording (24 bit @ 48 kHz) » Decay curve (planned) |
| Functions of Sound Insulation Option (optional) | <ul style="list-style-type: none"> • Standards ISO 16283 and ISO 717 • Airborne sound insulation • Results shown on XL3 • Averaging of source and receiving room • Results D, $D'n$, $D'nT$, R' • Chart and table • Planned <ul style="list-style-type: none"> » Flatness verification of adjacent one-third octave bands in sending room » Impact and facade sound insulation » ASTM E336 (US), Document E (UK) • Requires Extended Room Acoustics Option |

Reporting and Analysis Software

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| Data Explorer (optional) | <ul style="list-style-type: none"> • Enables the import of measurement data into the Data Explorer software • Powerful data processor for easy and fast analysis of sound level measurement data on PC |
| Sound Insulation Reporter (optional) | <ul style="list-style-type: none"> • Enables the import of noise spectrum and reverberation time measurement data in 1/3 octave band resolution into the Sound Insulation Reporter software • Software provides all tools for fast data analysis and standardized reporting of airborne, impact and facade sound insulation measurements on PC • Standards ASTM E336, ASTM E413, ASTM E1007, ASTM E989, ASTM E966, ASTM E1332, BB93, DIN 4109, Document E, GB/T 19889, ISO 16283, ISO 140, ISO 717, ISO 10140, NEN 5077:2019, SIA 181:2006, SIA 181:2020 |
| Room Acoustics Reporter (optional) | <ul style="list-style-type: none"> • Frequency response spectrum and Noise Curves • Room acoustic simulation according to Sabine or Eyring • Import of own sound absorber database and tolerances • Standards GB 50371, IEC 61260, ANSI/ASA S12.2-2019, DIN 15996:2020, ISO R 1996-1971, ASR A3.7:2021, DIN 18041:2016, ISO 3382-1:2009, ISO 3382-2:2008, ÖNORM B 8115-3:2015, ASTM C423-17, ISO 354:2003 |

Calibration

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| Free-field Correction | <ul style="list-style-type: none"> • NTi Audio Class 1 Sound Calibrator <ul style="list-style-type: none"> » M2230: -0.1 dB » M2340: -0.1 dB » M2211: -0.1 dB » M2215: -0.1 dB • NTi Audio Class 1 Sound Calibrator with 1/4" Calibration Adapter, type ADP 1/4-P <ul style="list-style-type: none"> » M4260: +0.1 dB » M4261: +0.2 dB |
| Wind Screen Correction | <ul style="list-style-type: none"> • 50 mm Wind Screen: +0,12 dB • 90 mm Wind Screen: +0,19 dB • WP30/WP61 Wind Screen 90 mm: +0,19 dB |
| Calibration | <ul style="list-style-type: none"> • Recommended calibration interval: one year • Microphone calibration with external calibrator supported • Optional calibration certificate for new instruments available |

| Input / Output Interfaces | |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Microphone Input | <ul style="list-style-type: none"> • XLR balanced <ul style="list-style-type: none"> » Input impedance = 192 kOhm » Phantom power: +48 VDC switchable with maximum 10 mA supply current in accordance with IEC 61938 » Automated sensor detection for NTi Audio's ASD measurement microphones and pre-amplifiers • Level range: -112 dBu to +48 dBu • Dynamic range: 160 dB • Frequency range: 1 Hz to 40 kHz • THD (Total harmonic distortion): - 110 dB |
| Network | <ul style="list-style-type: none"> • Wi-Fi integrated (2.4 GHz) • LAN via USB adapter • USB-C as host or slave, USB-A as host • Data and website access via USB • Web server, ftp, ntp • 4G/5G via optional external gateway • Remote access connect.nti-audio.com (optional for more than 2 GB/month) |
| Audio Outputs | <ul style="list-style-type: none"> • Built-in speaker • Headphone connector 3.5 mm Minijack, stereo |
| Digital I/O | <p>Connection interface to accessories</p> <ul style="list-style-type: none"> • SDI-12 and 1-Wire • M8 Connector, 4-pole <ul style="list-style-type: none"> » pin 1 ground » pin 2 SDI-12 » pin 3 mains power supply of XL3 (switchable) » pin 4 1-Wire <p>(prepared for later firmware extension)</p> |

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| Memory | <ul style="list-style-type: none"> • SD Card included (32 GByte), removable, storing measurement data in ASCII format, screenshots and wav-files • Supports external hard disk (not included) <p>Data logging every second offers following noise monitoring periods:</p> <ul style="list-style-type: none"> • Logging default noise levels: > 8 years • Additional logging of 1/3 octave data: > 2 years • Additional <ul style="list-style-type: none"> » compressed audio recording: > 4 weeks » linear audio recording: > 60 hours <p>Larger SD Cards may be used for longer monitoring requirements</p> |
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| Power Supply | <ul style="list-style-type: none"> • Rechargeable & removable Li-Po battery included <ul style="list-style-type: none"> » Model no. PA-L2485.R001 » Type 3.6 V / 6.7 Ah / 24 Wh » Typical battery lifetime > 8 hours @ display on » Typical battery lifetime > 12 hours @ display off » Typical charging time (10% ->80%): 2.5 hours » Typical life time charging cycles: 800 » In order to increase battery lifetime, the XL3 automatically limits the battery charging at 4.05V which doubles the amount of charging cycles compared to a typical lithium battery. • Linear external power supply 9 VDC included <ul style="list-style-type: none"> » Range: 7.5 - 20.0 VDC @ minimum 6 Watt » Charges Li-Po battery during operation » Connector C5.5 x 2.1 x 12 mm • USB-C power supply supported (not included) • External battery pack <ul style="list-style-type: none"> » 22 Ah battery pack: 8 days » 44 Ah battery pack: 16 days |
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| General | |
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| Clock | <ul style="list-style-type: none"> • Real-time clock with lithium backup battery • Drift < 0.1 seconds per 24 hours • Synchronizable to PPS signal |
| Mechanics | <ul style="list-style-type: none"> • Tripod or microphone stand mount 1/4" • Wire stand mounted on rear side • Display <ul style="list-style-type: none"> » 4.3" IPS color display with capacitive touch » 480 x 800 pixels • Dimensions (L x W x H) <ul style="list-style-type: none"> » 210 x 85 x 45 mm » 8.3 x 3.3 x 1.8" • Weight: 510 g (18 oz) including built-in Li-Po battery |
| Temperature | -10 °C to +50 °C (14° to 122°F) |
| Humidity | 5% to 90% RH, non-condensing |
| Static air pressure | 65 kPa to 108 kPa |
| Susceptibility to radio frequencies | Classification Group X |
| Electromagnetic Compatibility | CE compliant: EN 61326-1 Class B, EN 55011 class B EN 61000-4-2 to -6 & -11 |
| Protection Rating | IP51 |
| ATEX | <ul style="list-style-type: none"> • For applications in explosive atmospheres within zone 2 in accordance with IEC 60079 • Directive 2014/34/EU |

| Scope of Supply | |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| XL3 | <ul style="list-style-type: none"> • XL3 Acoustic Analyzer • Battery Pack • Mains Power Adapter • USB-C Cable • Hand strap |
| optional for connectivity | <ul style="list-style-type: none"> • LAN to USB-C adapter for LAN connection • 4G/LTE Gateway #600 076 011 for mobile communication |

Technical Data Microphones

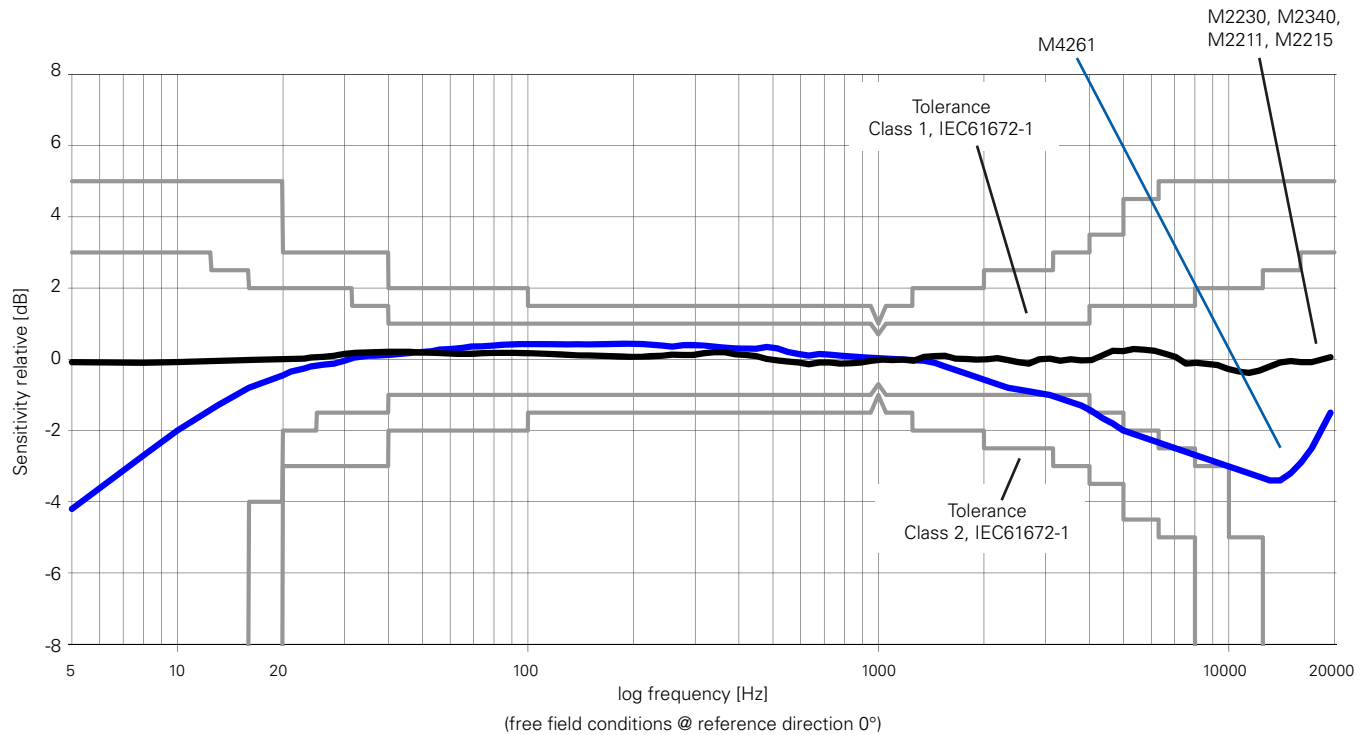
| | M2230 | M2340 (with self-test) | M2211 | M2215 (high levels) | M4261 |
|-----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|-----------------------------------------|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Classification with XL3 according to IEC 61672, ANSI S1.4 | Class 1 Certified | Class 1 | Frequency Response Class 1 | | Class 2 |
| Consisting of | PreAmplifier MA220 + MC230 or MC230A Capsule | PreAmplifier MA230 + MC230A Capsule | PreAmplifier MA220 + Capsule 7052 | PreAmplifier MA220 + Capsule 7056 | M4261 microphone with permanently installed capsule |
| Microphone Type | Omnidirectional, pre-polarized condenser, free field microphone | | | | |
| Capsule / Transducer | 1/2" detachable with 60UNS2 thread, type WS2F according IEC 61094-4 | | | | 1/4" permanently installed |
| PreAmplifier Type | MA220 | MA230 | MA220 | | - |
| System Self-test (CIC) | - | with XL3 | - | | |
| Flatness tolerance bands 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 ± 4.5 dB @ >10 kHz - 16 kHz ± 5 dB @ >16 kHz - 20 kHz |
| Actual Frequency Response | freely available as Excel-data, register product at https://my.nti-audio.com and contact info@nti-audio.com | | | | |
| Frequency Range | 5 Hz - 20 kHz | | | | |
| Residual Noise Floor typical | 16 dB(A) | 17dB(A) | 21 dB(A) | 25 dB(A) | 27 dB(A) |
| Maximum SPL @ THD 3%, 1 kHz, S_typical | 137 dBSPL | 138 dBSPL | 144 dBSPL | 153 dBSPL | 142 dBSPL |

| | M2230 | M2340 (with self-test) | M2211 | M2215 (high levels) | M4261 |
|-------------------------------------------|--------------------------------------------------------------------------|---------------------------|-----------------------------------|----------------------------------|-----------------------------------|
| Sensitivity typical @ 1 kHz | -27.5 dBV/Pa ±2 dB (42 mV/Pa) | | -34 dBV/Pa ±3 dB (20 mV/Pa) | -42 dBV/Pa ±3 dB (8 mV/Pa) | -36 dBV/Pa ±4 dB (16 mV/Pa) |
| Temperature Coefficient | < -0.01 dB / °C | | < ±0.015 dB / °C | | < ±0.02 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 | -0.005 dB / kPa | | -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 | | | | |
| Current Consumption typical | 2.3 mA | 0.8 mA | 2.3 mA | | 1.7 mA |
| Electronic Data Sheet | NTi Audio ASD in accordance with IEEE P1451.4 V1.0, Class 2, Template 27 | | | | |
| Output Impedance | 100 Ohm balanced | | | | |
| Connector | Balanced 3-pole XLR | | | | |
| Diameter Dimensions | 20.5 mm (0.8") | | | | |
| Length Dimensions | 154 mm (6.1") | | 150 mm (5.9") | | |
| Weight | 100 g (3.53 oz) | | | | 83 g (2.93 oz) |
| Environmental Protection | IP51 | | | | |
| Windscreen Diameter | 50 mm (2") | 90 mm (3.5") | 33 mm (1.3") | 33 mm (1.3") | 33 mm (1.3") |
| Scope of Supply | Windscreen, Microphone Holder with Adapter 5/8" - 3/8"; Manual | | | | |
| NTi Audio # | 600 040 050 | 600 040 230 | 600 040 022 | 600 040 045 | 600 040 070 |

Outdoor Measurement Microphones

| | M2230-WP (M2230+WP30) | M2340-WP (M2340+WP30) | M4261-WP (M4261+WP61) |
|-----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|----------------------------------------------------|
| Classification with XL3 according to IEC 61672, ANSI S1.4 | Class 1 Certified | Class 1 | Class 2 |
| System Self-test (CIC) | - | with XL3 | - |
| Windscreen Diameter | 90 mm (3.5") | | |
| Diameter Dimensions | 36 mm (1.4") | 36 mm (1.4") | 36 mm (1.4") |
| Length Dimensions | 378 mm (14.9") | 378 mm (14.9") | 378 mm (14.9") |
| Weight | 430 g, 15.17 oz | 430 g, 15.17 oz | 413 g, 14.57 oz |
| Environmental Protection | IP54 in vertical position | IP54 in vertical position | IP54 in vertical position |
| Mounting | Standard 3/8" tripod mount included | | |
| Optional Pole Mount Adapter | <ul style="list-style-type: none"> • Pole Mount Adapter PM 1" • Pole Mount Adapter PM 1 1/4" | for pole diameter 25 - 33 mm (1-1.3") for pole diameter 32 - 44 mm (1.25-1.75") | NTi Audio # 600 040 067 NTi Audio # 600 040 068 |
| NTi Audio # | 600 040 050 + 600 040 060 | 600 040 230 + 600 040 060 | 600 040 070 + 600 040 080 |

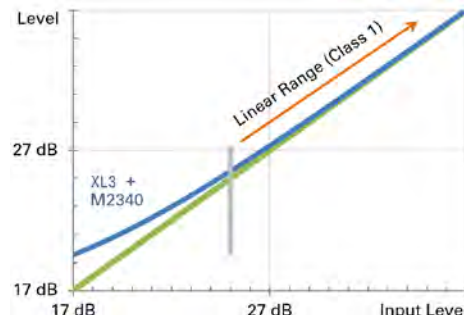
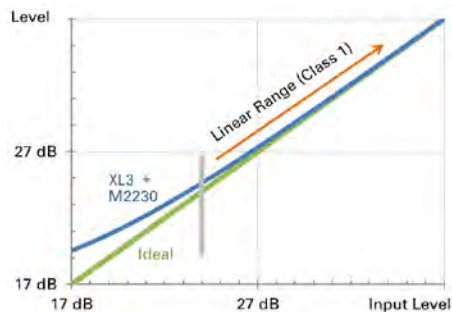
Typical Frequency Response of Measurement Microphones



Linear Measurement Range
acc. IEC61672 / ANSI S1.4
(typ. microphone sensitivity)

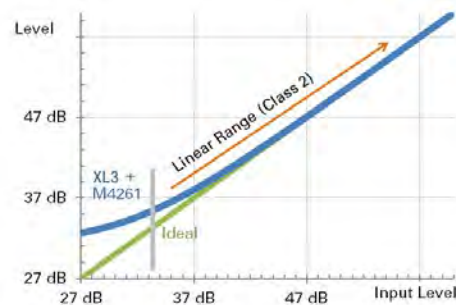
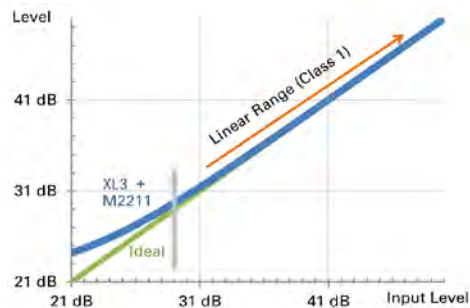
XL3 + M2230: 24 dB(A) - 137 dB

XL3 + M2340: 25 dB(A) - 138 dB



XL3 + M2211: 29 dB(A) - 144 dB

XL3 + M4261: 33 dB(A) - 146 dB



Free Field - Pressure Correction Factors

If a measurement microphone is held in a free-field environment, then the measurement microphone acts at high frequencies like a reflector. The sound pressure increases in front of the microphone capsule membrane. M2230, M2340, M2211 and M2215 are free-field equalized measurement microphones, they compensate for the increased pressure internally. The calibration of the measurement microphones M2230 and M2340 with the B&K 4226 requires the accessory Adapter Ring MXR01, NTi Audio # 600 040 105. Please note, never touch the diaphragm of the measurement microphone capsule.

The calibrator no longer offers free-field conditions. Therefore, the free-field equalization of the microphone must be compensated. This needs to be considered prior the calibration. The correction value needs to be added to the pressure response of the microphone.

Example:

- During the calibration, the XL3 measures the sound level in the calibrator. If the B&K 4226 calibrator is used and it is set to 16 kHz, then the XL3+M2230 reads just 86.7 dBA.
- The free-field sound level is calculated by summing the XL3 measurement value and the correction value (86.7 dB + 7.3 dB = 94.0 dB).

The following corrections apply with the B&K 4226 calibrator:

| Nominal Frequency [Hz] | M2230, M2340 with MXR01 Adapter [dB] | M2230, M2340 [dB] | M2211 [dB] | M2215 [dB] | Measurement Uncertainty U [dB] |
|------------------------|--------------------------------------|-------------------|------------|------------|--------------------------------|
| 31.5 | -0.3 | 0.0 | -0.2 | 0.0 | 0.3 |
| 63 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 |
| 125 | -0.2 | 0.0 | -0.1 | -0.1 | 0.3 |
| 250 | -0.2 | 0.0 | -0.1 | -0.1 | 0.3 |
| 500 | -0.2 | 0.0 | -0.1 | -0.1 | 0.3 |
| 1000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 |
| 2000 | 0.1 | 0.3 | 0.1 | 0.0 | 0.3 |
| 4000 | 0.7 | 0.7 | 0.7 | 0.4 | 0.3 |
| 8000 | 2.7 | 2.6 | 4.5 | 4.7 | 0.4 |
| 12500 | 7.2 | 6.0 | 5.8 | 6.1 | 0.7 |
| 16000 | 7.3 | 7.3 | 7.9 | 7.9 | 0.8 |

Correction values for other calibrators for M2230 and M2340:

| Type | Correction Value | Calibration Frequency | Calibration Level |
|-------------------|------------------|-----------------------|-------------------|
| NTi Audio CAL200 | -0.1 | 1 kHz | 114 dB |
| B&K 4231 | -0.2 | 1 kHz | 114 dB |
| Norsonic Nor-1251 | -0.2 | 1 kHz | 114 dB |

Actuator Correction

The following free-field 0° incidence corrections apply for calibration using a protection grid actuator (e.g. B&K UA033, GRAS RA0014). Please note, never touch the diaphragm of the measurement microphone capsule. The maximum DC bias for the actuator calibration is 200 VDC.

M2211, M2215

| Nominal Frequency [Hz] | M2211 [dB] | M2215 [dB] |
|------------------------|------------|------------|
| 31.5 | 0.0 | 0.0 |
| 63 | 0.0 | 0.0 |
| 125 | 0.0 | 0.0 |
| 250 | 0.0 | 0.0 |
| 500 | 0.1 | 0.0 |
| 1000 | 0.1 | 0.0 |
| 2000 | 0.6 | 0.2 |
| 4000 | 1.7 | 1.2 |
| 8000 | 4.2 | 3.9 |
| 12500 | 7.3 | 6.7 |
| 16000 | 9.2 | 9.0 |

M2230, M2340

The calibration requires the accessory Actuator Grid, NTi Audio # 600 040 112. The Actuator Grid comes with an insulation ring dedicated for this measurement method.

| Nominal Frequency [Hz] | M2230, M2340 [dB] |
|------------------------|-------------------|
| <400 | 0.0 |
| 400 | -0.2 |
| 500 | 0.0 |
| 630 | -0.2 |
| 800 | 0.0 |
| 1000 | 0.0 |
| 1250 | -0.1 |
| 1600 | 0.2 |
| 2000 | 0.2 |
| 2500 | 0.3 |
| 3150 | 0.8 |
| 4000 | 1.0 |
| 5000 | 1.6 |
| 6300 | 2.4 |
| 8000 | 3.6 |
| 10000 | 4.8 |
| 12500 | 6.5 |
| 16000 | 9.3 |
| 20000 | 11.7 |

Diffuse-field Sensitivity Level Correction

A diffuse sound field is characterized by the sound arriving at the receiver from all directions with more or less equal probability. The M2230, M2340, M2211, M2215 and M4261 are free-field equalized measurement microphones. The default frequency response refers to a 0° sound incidence. The diffuse-field sensitivity level correction is calculated by averaging the directional characteristics in accordance with IEC 61183. The corrections for diffuse-field conditions are documented in the following table and may be activated directly on the XL3; see Spectral Corrections. The directional response of the M2230 is described in the appendix.

Example:

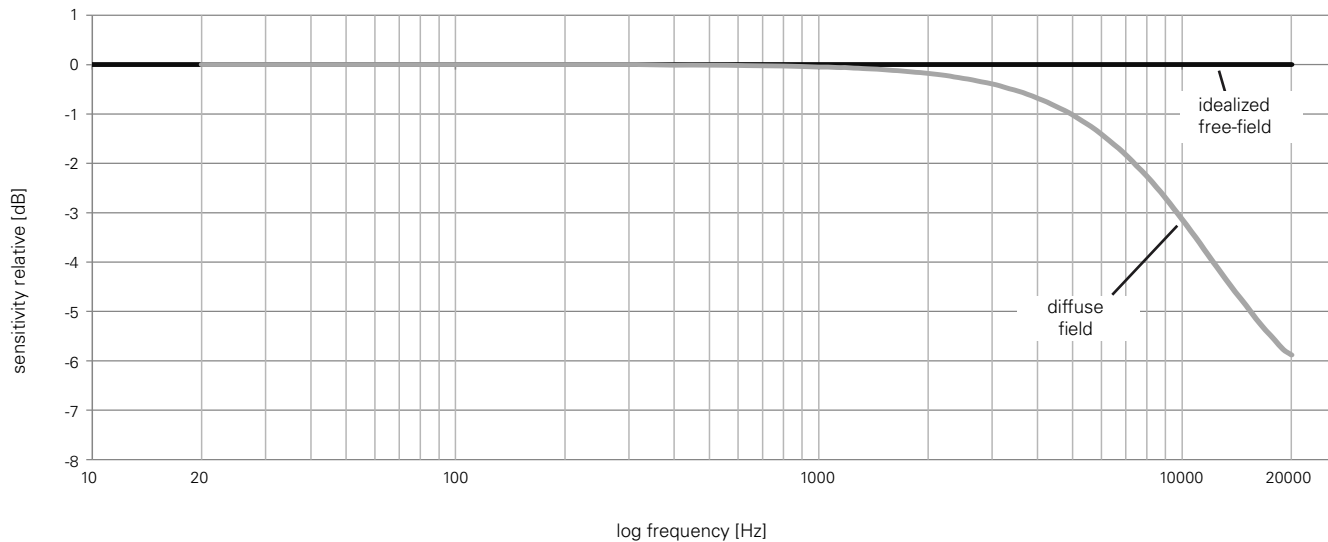
- The sound pressure level in a diffuse sound field shall be determined. The display of the XL3 with the M2230 reads 80.0 dBA for the 20 kHz third-octave band.
- The diffuse sound level is now calculated from the sum of the XL3 measurement value and the correction value (80.0 dB + 5.9 dB = 85.9 dB).



The diffuse-field sensitivity level correction is not necessary using a diffuse field equalized measurement microphone.

| Nominal Frequency [Hz] | 1/2" Microphone M2230, M2340, M2211, M2215 [dB] | 1/4" Microphone M4261 [dB] |
|------------------------|----------------------------------------------------------|----------------------------------|
| <63 | 0.0 | 0.0 |
| 63 | 0.0 | 0.0 |
| 80 | 0.0 | 0.0 |
| 100 | 0.0 | 0.0 |
| 125 | 0.0 | 0.0 |
| 160 | 0.0 | 0.0 |
| 200 | 0.0 | 0.0 |
| 250 | 0.0 | 0.0 |
| 315 | 0.0 | 0.0 |
| 400 | 0.0 | 0.0 |
| 500 | 0.0 | 0.0 |
| 630 | 0.0 | 0.0 |
| 800 | 0.0 | 0.0 |
| 1000 | 0.0 | 0.0 |
| 1250 | 0.1 | 0.1 |
| 1600 | 0.2 | 0.1 |
| 2000 | 0.2 | 0.1 |
| 2500 | 0.4 | 0.2 |
| 3150 | 0.6 | 0.3 |
| 4000 | 0.8 | 0.3 |
| 5000 | 1.3 | 0.5 |
| 6300 | 1.8 | 0.8 |
| 8000 | 2.5 | 1.1 |
| 10000 | 3.4 | 1.6 |
| 12500 | 4.4 | 2.2 |
| 16000 | 5.3 | 2.8 |
| 20000 | 5.9 | 3.4 |

Free-field and Diffuse-Field Sensitivity for M2230 and M2340



Spectral Correction for horizontal Sound Incidents using the Outdoor Microphone

The outdoor measurement microphone fulfills the requirements of IEC 61672 and ANSI S1.4 for vertical sound incidence. For compliance with horizontal sound incidence a spectral correction is employed in the associated XL3 Sound Level Meter.

Spectral Correction for horizontal sound incidents:

| Nominal Frequency [Hz] | WP30 Weather Protection [dB] | | WP61 Weather Protection [dB] | |
|------------------------------|------------------------------------|------------|------------------------------------|------------|
| | 1/3 Octave | 1/1 Octave | 1/3 Octave | 1/1 Octave |
| <800 | 0.0 | 0.0 | 0.0 | 0.0 |
| 800 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1000 | 0.0 | | 0.0 | |
| 1250 | 0.1 | | 0.0 | |
| 1600 | 0.2 | 0.4 | 0.2 | 0.4 |
| 2000 | 0.3 | | 0.3 | |
| 2500 | 0.7 | | 0.8 | |
| 3150 | 1.3 | 2.0 | 1.4 | 2.0 |
| 4000 | 2.0 | | 2.1 | |
| 5000 | 2.7 | | 2.5 | |
| 6300 | 2.9 | 3.4 | 2.3 | 2.5 |
| 8000 | 3.3 | | 2.4 | |
| 10000 | 3.9 | | 2.8 | |
| 12500 | 4.6 | 5.9 | 3.0 | 3.0 |
| 16000 | 6.4 | | 3.1 | |
| 20000 | 6.8 | | 3.1 | |

Technical Data PreAmplifier

| | MA220 PreAmplifier | MA230 PreAmplifier with self-test (CIC) |
|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| Microphone PreAmplifier | Compatible with 1/2" microphone capsules type WS2F in accordance with IEC61094-4 | |
| Frequency Range (-3dB) | 4 Hz - 100 kHz | 1.3 Hz - 50 kHz |
| Residual Noise Floor typical | 1.9 μ V(A) at C_in 15 pF \pm 5.6 dBA @ 42 mV/Pa | 2.4 μ V(A) at C_in 15 pF \pm 9.1 dBA @ 42 mV/Pa |
| Frequency Response Flatness | \pm 0.2 dB | \pm 0.1 dB, 10 Hz - 20 kHz |
| Phase Linearity | < 1° @ 20 Hz - 20 kHz | |
| Maximum Output Voltage @ THD 3%, 1 kHz | 21 Vpp \pm 7,4 Vrms \pm 138,9 dBSPL @ 42 mV/Pa | 22 Vpp \pm 7,8 Vrms \pm 139,3 dBSPL @ 42 mV/Pa |
| Electronic Data Sheet | Containing user calibration data; default factory sensitivity = 4.9 V/Pa Read/write by XL3 Audio and Acoustic Analyzer NTi Audio ASD in accordance with IEEE P1451.4 V1.0, Class 2, Template 27 | |
| Impedance | Input: 20 GOhm // 0.26 pF, Output: 100 Ohm balanced | |
| Power Supply | 48 VDC phantom power, 2.3 mA typical | 48 VDC phantom power, 0.8 mA typical |
| Attenuation | < 0.17 dB (Rphantom 2x 6.8 kOhm) | < 0.07 dB (Rphantom 2x 6.8 kOhm) |
| Connector | Balanced 3-pole XLR | |
| Thread for Capsule | 60 UNS2 | |
| Weight | 90 g, 3.17 oz | |
| Dimensions | Length 142.5 mm (5.6"), diameter 20.5 mm (0.8") | |
| Temperature Range | -10°C to +50°C (14°F to 122°F) | |
| Humidity | 5% to 90% RH, non-condensing | |
| NTi Audio # | 600 040 040 | 600 040 200 |

The product specifications may vary based on the mounted microphone capsule type.

Diffuse-field Sensitivity Level Correction

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Example:

- The sound pressure level in a diffuse sound field shall be determined. The display of the XL3 with the M2230 reads 80.0 dBA for the 20 kHz third-octave band.
- The diffuse sound level is now calculated from the sum of the XL3 measurement value and the correction value (80.0 dB + 5.9 dB = 85.9 dB).



The diffuse-field sensitivity level correction is not necessary using a diffuse field equalized measurement microphone.

| Nominal Frequency [Hz] | 1/2" Microphone M2230, M2340, M2211, M2215 [dB] | 1/4" Microphone M4261 [dB] |
|------------------------|----------------------------------------------------------|----------------------------------|
| <63 | 0.0 | 0.0 |
| 63 | 0.0 | 0.0 |
| 80 | 0.0 | 0.0 |
| 100 | 0.0 | 0.0 |
| 125 | 0.0 | 0.0 |
| 160 | 0.0 | 0.0 |
| 200 | 0.0 | 0.0 |
| 250 | 0.0 | 0.0 |
| 315 | 0.0 | 0.0 |
| 400 | 0.0 | 0.0 |
| 500 | 0.0 | 0.0 |
| 630 | 0.0 | 0.0 |
| 800 | 0.0 | 0.0 |
| 1000 | 0.0 | 0.0 |
| 1250 | 0.1 | 0.1 |
| 1600 | 0.2 | 0.1 |
| 2000 | 0.2 | 0.1 |
| 2500 | 0.4 | 0.2 |
| 3150 | 0.6 | 0.3 |
| 4000 | 0.8 | 0.3 |
| 5000 | 1.3 | 0.5 |
| 6300 | 1.8 | 0.8 |
| 8000 | 2.5 | 1.1 |
| 10000 | 3.4 | 1.6 |