NTi Audio M2230 Class 1 Measurement Microphone Owner's Manual

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NTi Audio M2230 Class 1 Measurement Microphone

Technical Data Measurement Microphones

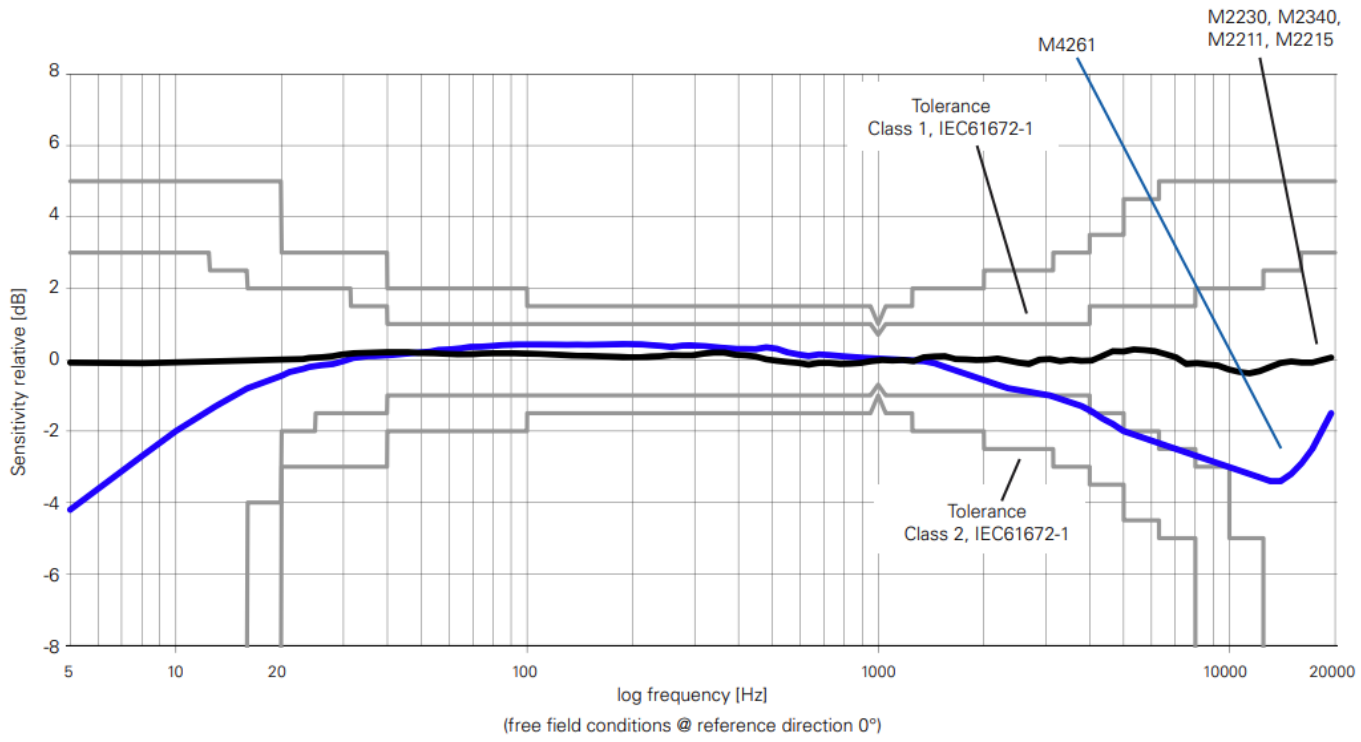
	M2230	**M2340** **(with self-test)**	**M2211**	**M2215** **(high levels)**	**M4261**
Classification with XL2 accord- ing to IEC 61672, ANSI S1.4	Class 1 Certified	Class 1	Frequency Response Class 1		Class 2
Consisting of	PreAmplfier MA220 + MC230 or MC230A Capsule	PreAmplfier MA230 + MC230A Capsule	PreAmplfier MA220 + Capsule 7052	PreAmplfier 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 XL2	–		
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 microphone at My NTi Audio 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 dB SPL	144 dB SPL	153 dB SPL	142 dB SPL

	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 ±3 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				
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 XL2 accord- ing to IEC 6167 2, ANSI S1.4	Class 1 Certified	Class 1	Class 2
System Self-test (CIC)	–	with XL2	–
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 Protectio n	IP54 in vertical position	IP54 in vertical position	IP54 in vertical position
NTi Audio #	600 040 050 + 600 040 06 0	600 040 230 + 600 040 06 0	600 040 070 + 600 040 08 0

Typical Frequency Response of Measurement Microphones



Free Field – Pressure Correction Factors

If a measurement microphone is held in a free-field environ-ment, then the measurement microphone acts at high fre-quencies like a reflector. The sound pressure increases in front of the microphone capsule membrane. M2230, M2340, M2211 and M2215 are free-field equalized measurement mi-crophones, they compensate for the increased pressure inter-nally. 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 compen-sated. 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 XL2 measures the sound level in the calibrator. If the B&K 4226 calibrator is used and it is set to 16 kHz, then the XL2+M2230 reads just 86.7 dBA.
- The free-field sound level is calculated by summing the XL2 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

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 prob-ability. 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 f or diffuse-field conditions are documented in the following table and may be activated directly on the XL2; see

Spectral Corrections. The directional response of the M2230 is described in the appendix.

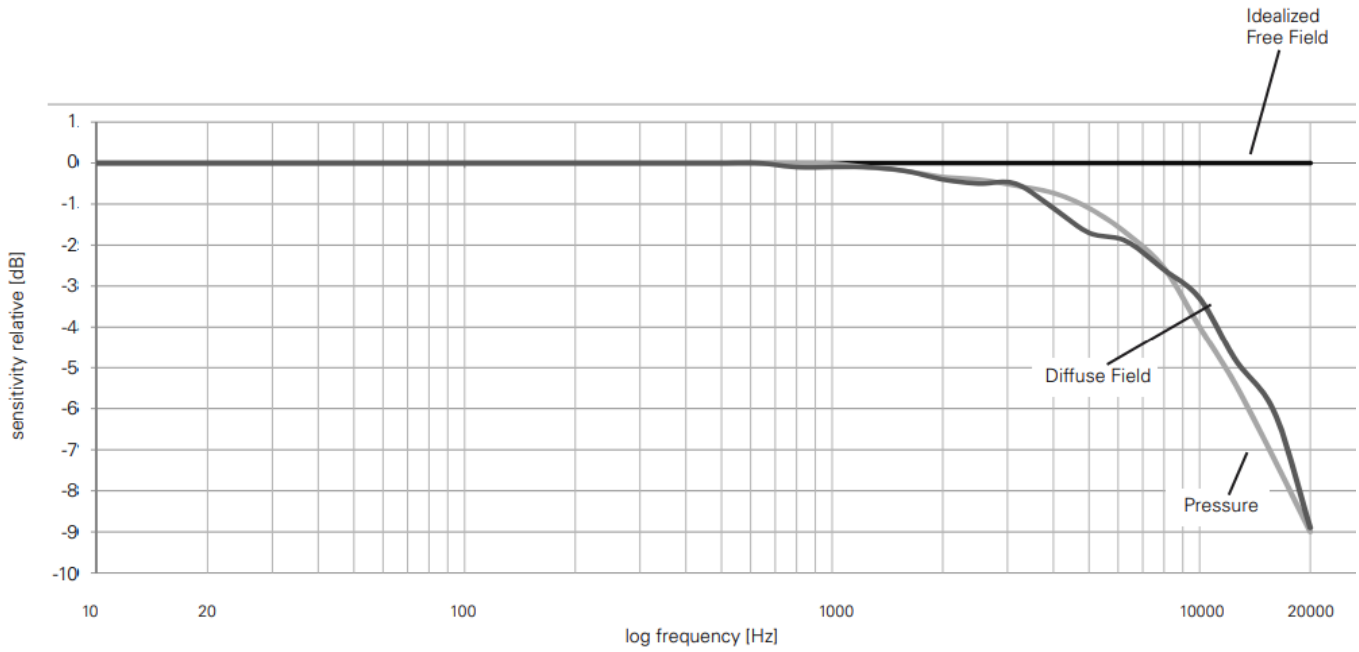
Example

- The sound pressure level in a diffuse sound field shall be determined. The display of the XL2 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 XL2 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 63 80	0.0 0.0 0.0	0.0 0.0 0.0
100 125 160	0.0 0.0 0.0	0.0 0.0 0.0
200 250 315	0.0 0.0 0.0	0.0 0.0 0.0
400 500 630	0.0 0.0 0.0	0.0 0.0 0.0
800 1000 1250	0.0 0.0 0.1	0.0 0.0 0.1
1600 2000 2500	0.2 0.2 0.4	0.1 0.1 0.2

3150 4000 5000	0.6 0.8 1.3	0.3 0.3 0.5
6300 8000 10000	1.8 2.5 3.4	0.8 1.1 1.6
12500 16000 20000	4.4 5.3 5.9	2.2 2.8 3.4

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



Spectral Correction for horizontal Sound Incidents using the Outdoor Microphone
The outdoor microphone M2230-WP fulfills Class 1 require-ments of IEC 61672 and ANSI S1.4 for vertical sound incidence. For compliance with horizontal sound incidence a spectral cor-rection is employed in the associated XL2 Sound Level Meter.


Calibrte
XLR
ASD 21:04
Spectral Correction: Off
Sensi
PLEASE
User
Sensc
Off (default)
Weather protection WP30
Community (horizontal →←)
Weather protection WP30
Aircraft (vertical ↓)
M22xx Diffuse Field 1/2"
M42xx Diffuse Field 1/4"

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	
1000 1250	0.0 0.1	0.0	0.0 0.0	0.0
1600	0.2		0.2	
2000 2500	0.3 0.7	0.4	0.3 0.8	0.4
3150	1.3		1.4	
4000 5000	2.0 2.7	2.0	2.1 2.5	2.0
6300	2.9		2.3	
8000 10000	3.3 3.9	3.4	2.4 2.8	2.5
12500	4.6		3.0	
16000 20000	6.4 6.8	5.9	3.1 3.1	3.0

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 V(A) at C_in 15 pF ≙ 5.6 dBA @ 42 mV/Pa	2.4 V(A) at C_in 15 pF ≙ 9.1 dBA @ 42 mV/Pa
Frequency Response Flatness	±0.2 dB	±0.1 dB, 10 Hz – 20 kHz
Phase Linearity	< 1° @ 20 Hz – 20 kHz	
Maximum Output Voltage @ THD 3%, 1 kHz	21 Vpp ≙ 7,4 Vrms ≙ 138,9 dBSPL @ 42 mV/Pa	22 Vpp ≙ 7,8 Vrms ≙ 139,3 dBSPL @ 42 mV/Pa
Electronic Data Sheet	Containing user calibration data; default factory sensitivity = 4.9 V/Pa Read/write by XL2 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

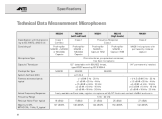
The product specifications may vary based on the mounted microphone capsule type.

Frequently Asked Questions

Q: How do I register my microphone at My NTi Audio?
A: To register your microphone, visit the My NTi Audio website and follow the provided instructions for registration.

Q: What is the maximum SPL of the M2215 microphone?
A: The maximum Sound Pressure Level (SPL) of the M2215 microphone is 144 dBSPL at 3% Total Harmonic Distortion (THD) at 1 kHz.

Documents / Resources

	**NTi Audio M2230 Class 1 Measurement Microphone** [pdf] Owner's Manual M2230, M2340, M2211, M2215, M4261, M2230-WP, M2340-WP, M2230 Class 1 Measurement Microphone, M2230, Class 1 Measurement Microphone, Measurement Microphone, Microphone

References

- **User Manual**