# Nova Sound Level Meters
# User Manual
# Part B
# Technical Information

This manual, the software to which it relates, the

program code and drawings are all:

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This manual should be used in conjunction with the document titled “User Manual for the Nova sound level meters”.

This manual refers to Nova sound level meters fitted with firmware version 2.4 or later.

The following table lists sections and tables in this manual where information required by specific sections of IEC 61672-1:2013 can be found. In certain instances the requested information is not applicable, as noted in the Comments column.

All tabular correction data in this manual is available in electronic spread sheet format on request from Pulsar Instruments plc. See Page 40 for contact details or visit http://www.pulsarinstruments.com/products/pulsar-nova-range

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| IEC 61672-1:2013 Section 5 | | |
|---|---|---|
| Section | Reference | Comments |
| 5.1.3 | See “User manual for the Nova sound level meters”, page 11 | |
| 5.1.4 | See “User manual for the Nova sound level meters”, page 13 | |
| 5.1.6 | See “User manual for the Nova sound level meters”, pages 45 | |
| 5.1.7 | See “User manual for the Nova sound level meters”, page 13 | |
| 5.1.8 | | Computer software is not a part of the Sound Level Meter |
| 5.1.10 | See “User manual for the Nova sound level meters”, page 45 | |
| 5.1.12 | | The Nova sound level meters have a single measurement range |
| 5.1.13 | See sections 9.3a and 9.3b – pages 19 and 19 | |
| 5.1.14 | See section 5.1.14 – page 7 | |
| 5.1.15 | See section 5.1.15 – page 7 | |
| 5.1.17 | See section 5.1.16 – page 7 | |
| 5.1.18 | | The Nova sound level meters are single-channel instruments. |
| 5.1.19 | See section 5.1.19 – page 7 | |
| 5.2.1 | See “User manual for the Nova sound level meters”, page 53 | |
| 5.2.3 | See “User manual for the Nova sound level meters”, page 53 | The microphone should be checked if the calibration offset deviates by more than 1 dB from the previous calibration. |
| 5.3.2.1 | See Appendix 1 – Nova correction data – page 22, and uncertainties on page 17 | |
| 5.3.3.1 | See Appendix 1 – Nova correction data – page 22 | |
| 5.3.5.1 | See section 9.3d – page 19 | |
| 5.3.5.3 | See section 9.3d – page 19 | |
| 5.5.8 | See section 9.2.2c – page 15 | There are no optional frequency responses. |
| 5.6.10 | See section 9.3f – page 19 | |
| 5.6.11 | See section 9.3g – page 20 | |
| 5.7.2 | See section 9.3i – page 20 | |
| 5.7.3 | See section 9.3i – page 20 | |
| 5.7.5 | | No special procedures are required for measuring noise levels close to self-generated noise. |
| 5.8.1 | See “User manual for the Nova sound level meters”, page 45, and section 9.2.2d – page 16 | |
| 5.11.1 | See “User manual for the Nova sound level meters”, page 19 | |
| 5.12.1 | See section 5.12.1 – page 8 | |
| 5.13.1 | See section 9.2.2i – page 16 | |
| 5.16.1 | See “User manual for the Nova sound level meters”, page 27 | |
| 5.17.1 | See section 5.17.1 – page 8 | |
| 5.18.1 | See “User manual for the Nova sound level | |

| | | |
|---|---|---|
| | meters”, page 24 | |
| 5.18.2 | See “User manual for the Nova sound level meters”, page 24 | |
| 5.18.3 | See “User manual for the Nova sound level meters”, page 24 | |
| 5.18.4 | See section 5.18.4 – page 8 | |
| 5.18.5 | See “User manual for the Nova sound level meters”, page 40 | |
| 5.18.6 | | The Nova sound level meters use no alternative display devices |
| 5.19.1 | See section 5.19.1 – page 8 | |
| 5.20.1 | See “User manual for the Nova sound level meters”, page 32 for instructions to set the clock and page 38 to set timers, and section 5.20.1 – page 9 for the nominal drift | |
| 5.20.2 | See section 5.20.2 – page 9 | |
| 5.21.1 | See “User manual for the Nova sound level meters”, page 52 | |
| 5.21.2 | See section 9.3n – page 21 | |
| 5.23.1 | See “User manual for the Nova sound level meters”, page 18 | |
| 5.23.2 | See section 9.3k – page 21 | |
| 5.23.3 | See “User manual for the Nova sound level meters”, page 14 | |
| 5.23.4 | See “User manual for the Nova sound level meters”, page 46 | |
| | | |
| IEC 61672-1:2013 Section 6 | | |
| Section | Reference | Comments |
| 6.1.2 | See section 9.3l – page 21 | |
| 6.2.2 | See section 6.2.2 – page 10, and “User manual for the Nova sound level meters”, page 13 | |
| 6.5.2 | See section 6.5.2 – page 10 | |
| 6.6.1 | See section 9.3o – page 21 | |
| 6.6.3 | See section 9.3o – page 21 | |
| 6.6.10 | See section 9.3o – page 21 | |
| 6.7 | See section 6.7 – page 10 | |
| | | |
| IEC 61672-1:2013 Section 7 | | |
| Section | Reference | Comments |
| 7.1 | See section 7.1 – page 10 | |
| 7.2 | See Appendix 1 – Nova correction data – page 22 | The WS90 90 mm diameter windshield is the only relevant accessory. |
| 7.3 | | The Nova conforms to the specifications of IEC 61672-1:2013 of the same performance class when the WS90 windshield is fitted. |
| 7.4 | See “User manual for the Nova sound level meters”, page 48 | |
| 7.5 | | No auxiliary devices are provided with the Nova. |
| | | |
| IEC 61672-1:2013 Section 9 | | |
| Section | Reference | Comments |
| 9.2.1a | See “User manual for the Nova sound level | |

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|---|---|---|
| | meters", page 44 | |
| 9.2.1b | See "User manual for the Nova sound level meters", page 11 | |
| 9.2.1c | See "User manual for the Nova sound level meters", page 45 | |
| 9.2.1f | See section 6.7 – page 10 | |
| 9.2.2a | See "User manual for the Nova sound level meters", page 48 | |
| 9.2.2b | See section 9.2.2b – page 11 and Appendix 1 – Nova correction data, page 22 | |
| 9.2.2c | See section 9.2.2c – page 15, and "User manual for the Nova sound level meters", page 45 | A-, C- and Z-weightings are provided, and are measured simultaneously. |
| 9.2.2d | See section 9.2.2d – page 16, and "User manual for the Nova sound level meters", page 45 | Fast, Slow and Impulse are provided, and are measured simultaneously. |
| 9.2.2e | | The Nova has no level range controls. |
| 9.2.2g | See "User manual for the Nova sound level meters", page 19, Section 5.18.4 – page 8 | |
| 9.2.2h | See section 9.3f – page 19 | |
| 9.2.2i | See section 9.2.2i – page 16 | |
| 9.2.2j | See "User manual for the Nova sound level meters", page 34 | |
| 9.2.2k | See "User manual for the Nova sound level meters", page 48 | |
| 9.2.3a | See "User manual for the Nova sound level meters", page 46 | |
| 9.2.3b | See "User manual for the Nova sound level meters", page 18 | |
| 9.2.3c | See "User manual for the Nova sound level meters", page 16 | |
| 9.2.4a | See "User manual for the Nova sound level meters", page 53 | The following acoustic calibrators may be used with Nova meters:<br>Class 1: Model 105<br>Class 2: Model 106 |
| 9.2.4b | See "User manual for the Nova sound level meters", page 22 | The calibration check frequency is 1 kHz. |
| 9.2.4c | See "User manual for the Nova sound level meters", page 21 | Nova will accept a new acoustic calibration offset if the level is stable and the new offset is in the range ±7.0 dB. |
| 9.2.5a | See section 9.2.5a – page 17 | |
| 9.2.5b | See section 9.2.5a – page 17 | |
| 9.2.5c | See section 9.2.5a – page 17 | |
| 9.2.5d | See section 9.3d – page 19 | |
| 9.2.6a | See section 9.2.6a – page 19 | |
| 9.2.6b | See section 9.2.6b – page 19 | |
| 9.2.6c | | No special procedures are required for measuring noise levels close to the self-generated noise. |
| 9.2.6d | See section 5.1.19 – page 7 | |
| 9.2.6e | See section 6.2.2 – page 10 | |
| 9.2.6f | See "User manual for the Nova sound level meters", page 32 for instructions to set the clock and page 33 to set timers | |
| 9.2.6g | See section 5.20.2 – page 9 | |
| 9.2.6h | See section 5.1.14 – page 7 | |

| | | |
|---|---|---|
| 9.2.6i | See section 5.1.14 – page 7 | |
| 9.2.6j | See section 5.1.14 – page 8, section 5.11.1 – page 8 and section 5.12.1 – page 8, and “User manual for the Nova sound level meters”, page 19 | |
| 9.2.6k | See section 5.17.1 – page 8 | |
| 9.2.6l | See “User manual for the Nova sound level meters”, page 40 | |
| 9.2.6m | See “User manual for the Nova sound level meters”, page 52 | |
| 9.2.6n | See section 5.1.15 – page 7 | |
| 9.2.7a | See Appendix 1 – Nova correction data – page 22 | The Nova conforms to the specifications of IEC 61672-1:2013 of the same performance class when the WS90 windshield is fitted. |
| 9.2.7b | | No correction is required for standard microphone extension cables. |
| 9.2.7c | See “User manual for the Nova sound level meters”, page 48 | |
| 9.2.7d | | No auxiliary devices are provided with the Nova. |
| 9.2.8a | | No components of the Nova are intended to be operated only in an environmentally controlled enclosure. |
| 9.2.8b | See section 6.5.2 – page 10 | |
| 9.2.8c | See “User manual for the Nova sound level meters”, page 58, and section 9.2.8c – page 19 | |
| 9.3a | See section 9.3a – page 19 | |
| 9.3b | See section 9.3b – page 19 | |
| 9.3c | See section 9.3c – page 19 | |
| 9.3d | See section 9.3d – page 19 | |
| 9.3f | See section 9.3f – page 19 | |
| 9.3g | See section 9.3g – page 20 | |
| 9.3h | See section 5.1.15 – page 7 | |
| 9.3i | See section 9.3i – page 20 | |
| 9.3j | See section 5.1.17 – page 7 | |
| 9.3k | See section 9.3k – page 21 | |
| 9.3l | See section 9.3l – page 21 | |
| 9.3m | See section 9.3m – page 21 | |
| 9.3n | See section 9.3n – page 21 | |
| 9.3o | See section 9.3o – page 21 | |

# Section 5

## 5.1.14 Description of **Start**, **Stop** and **Restart** functions

These functions control the measurement of LxyMax, LxyMin, Lxeq,t and LxPeak.

Start is on the left-hand softkey while the instrument is not yet running a measurement.

Stop is available while a measurement is in progress. If Pause Mode is enabled (via the Advanced Menu) hold the right-hand softkey for four seconds then release it, or press it briefly to enter Pause Mode then press it again to stop. The Stop function stores the measurement, suspends accumulation of data then clears the latching overload indicator.

Restart is available from the Main Menu: while a measurement is in progress press the centre 'Menu' softkey then select the upper left-hand 'Reset' icon. The Reset function clears all accumulated data and clears the latching overload indicator.

Note that the term 'Hold' means the storage and display of the highest (or lowest) value of a given data type during a measurement period. LMax and LPeak hold the highest value; LMin holds the lowest.

## 5.1.15 Electrical testing method

Electrical testing is done by removing the microphone capsule by unscrewing it from the top of the preamplifier, and replacing it with a standard 1/2” 60UNS threaded dummy microphone of series capacitance 18 ± 2 pF fed from a signal source of impedance 50 Ω.

The Pulsar Instruments dummy microphone type KP:66 is recommended. The KP:66 has a standard BNC input socket and capacitance 18 pF.

Other types of dummy microphone may be used, but please take care that the device has a capacitance of 18 ± 2 pF.

The input sensitivity is nominally 50 mV/Pa (i.e. a signal of 50 $mV_{RMS}$ at a suitable frequency produces a sound level reading of 94 dB).

Note that the exact sensitivity varies depending on the specific microphone capsule with which the instrument has been calibrated.

All microphone types fitted to the Nova range share the same electrical substitution method and characteristics.

## 5.1.17 Highest sound pressure level

Maximum permissible sound pressure level for all microphone types fitted to the Nova range is 160 dB.

Maximum input voltage at the input to the dummy microphone is 30 $V_{pk-pk}$ .

## 5.1.19 Start-up period

After being switched on, the Nova is ready to make measurements as soon as the display shows its normal operating view and the date and time are shown in the footer bar (i.e. after the initial boot-up sequence has completed).

This is typically between 5 and 15 seconds after switching on.

### 5.11.1 Overload indication

Overload is indicated by the word 'overload' (in the chosen language) on the display. On the Sound Level View and Leq View the overload indicator is situated beneath and to the left of the large number.

When a measurement is NOT in progress, the overload indicator is shown for at least 1 second, so that very short transient overload conditions are visible to the operator.

When a measurement IS in progress, the overload indicator stays on until the measurement is stopped or reset.

In some circumstances the overload and under-range indicators will be shown simultaneously. In this case the text will be abbreviated to save space.

The overload indicator is also shown when measurements are recalled from memory in Recall Mode.

### 5.12.1 Under-range indication

Under-range is indicated by the word 'under-range' (in the chosen language) on the display. On the Sound Level View and Leq View the overload indicator is situated beneath and to the left of the large number.

The under-range indicator is shown for at least 1 second, so that very short transient under-range conditions are visible to the operator.

Under-range is indicated on the Sound Level View and Leq View. The level below which under-range is displayed depends on the frequency weighting shown for the 'big number' on the selected display page:

A-weighting – less than 24.0 dB
C-weighting – less than 35.0 dB
Z-weighting – less than 45.0 dB

In some circumstances the overload and under-range indicators will be shown simultaneously. In this case the text will be abbreviated to save space.

Note that if any displayed decibel value on the Sound Level View or Leq View is below 14.0 dB, the value will be replaced by dashes ('---'). These levels are typically below the self-generated noise of the microphone capsule and so will only be encountered during electrical testing.

### 5.17.1 User adjustable thresholds

There are no user adjustable thresholds in the Nova sound level meter, within the scope of IEC 61672-1:2013.

Note: some models include the Dose View, which features adjustable thresholds. These functions conform to IEC 61252 – Personal Sound Exposure Meters.

### 5.18.4 Display update rate

The display update rate for numerical values is 0.5 seconds for SPL functions and 1 second for Leq functions. The Nova sound level meters displays a valid integrated noise level 5 seconds after the start of a measurement.

### 5.19.1 Electrical output specifications

AC output is provided for testing purposes only. No electrical outputs are within the scope of IEC 61672-1:2013.

AC output is provided on Pin 4 of the 18-way utility connector (with Ground on Pin 1), and on the tip of the 2.5 mm stereo jack connector (with Ground on the outer ring).

The AC output is a buffered amplifier capable of driving loads down to 32 Ω.

The highest maximum output voltage before clipping is 1.7 $V_{pk-pk}$.

The maximum output power is 35 mW, and short circuit AC current will not exceed 100 mA.

The AC output is terminated internally with a series capacitor of 100 µF that is discharged to ground via 1 MΩ.

External equipment connected to the AC output should have a load resistance of 100 kΩ or greater, and must not have a significant capacitive component.

The AC output has four user-selectable gain settings available via the “Advanced, AC out” Menu: High/Low levels, and +20 dB amplifier On/Off.

Voltages and full scale levels are as follows:

High levels (70-140 dB)

0 dB gain: 1.3 $V_{pk-pk}$ (450 $mV_{RMS}$) at full scale 140 dB
+20 dB gain: 1.7 $V_{pk-pk}$ (600 $mV_{RMS}$) at full scale 132 dB

Low levels (20-90 dB)

0 dB gain: 400 $mV_{pk-pk}$ (140 $mV_{RMS}$) at full scale 90 dB
+20 dB gain: 1.3 $V_{pk-pk}$ (450 $mV_{RMS}$) at full scale 90 dB

The ring on the stereo jack socket is configured as a digital input. It is connected internally to +3.3 V via a 1 MΩ resistor. This input is not used on the Nova.

### 5.20.1 Clock

Real-time clock drift is ±2 seconds per day at temperatures between 20 and 25 °C.

### 5.20.2 Minimum and maximum integration times

The minimum integration time for manual measurements is 5 seconds.

The integration time ranges from 1 minute up to 240 hours in “Timer” mode, and from 5 seconds up to 30 days in manual mode (depending on instrument capabilities and storage settings).

# Section 6

## 6.2.2 Static pressure

The PM1 microphone capsule has a typical static pressure linear coefficient of -0.0066 dB/kPa at 1 kHz (-0.0076 dB/kPa at 250 Hz). This corresponds to a change of -0.28 dB between 65 kPa and 108 kPa. Static pressure has no effect on the Nova without its microphone fitted.

The Model 105 acoustic calibrator uses internal static pressure compensation to keep its output sound level within specified tolerance limits between 108 kPa and 65 kPa static pressure with a design deviation 0.00 dB. Therefore no additional correction by the operator is necessary.

To measure sound levels at locations where the static pressure is lower than 85 kPa, calibrate the instrument with a Model 105 acoustic calibrator which produces a sound pressure that is compensated for the low pressure.

## 6.5.2 Electrostatic discharge

The instrument does not suffer permanent degradation or loss of functions after electrostatic discharges of up to ±4 kV by contact or ±8 kV by air discharge. Temporary loss of function may result: the instrument may restart.

## 6.7 Influence of mechanical vibrations

Mechanical vibrations with an acceleration of 1 m/s² perpendicular to the plane of the membrane of the microphone at frequencies of 31.5, 63, 125, 250, 500, 630, 800 and 1000 Hz will increase the lower limit of the linear operating range of the A-weighting to 86 dB.

Mechanical vibrations with an acceleration of 1 m/s² parallel to the plane of the membrane increases the lower limit of the linear working range of the A-weighting to 72 dB.

To minimize the influence of mechanical vibration on the indicated sound levels, try to position the Nova so the vibrations are parallel to the membrane of the microphone.

# Section 7

## 7.1 Microphone extension cables

The PSR205 is the standard microphone extension cable, with a length of 5 m.

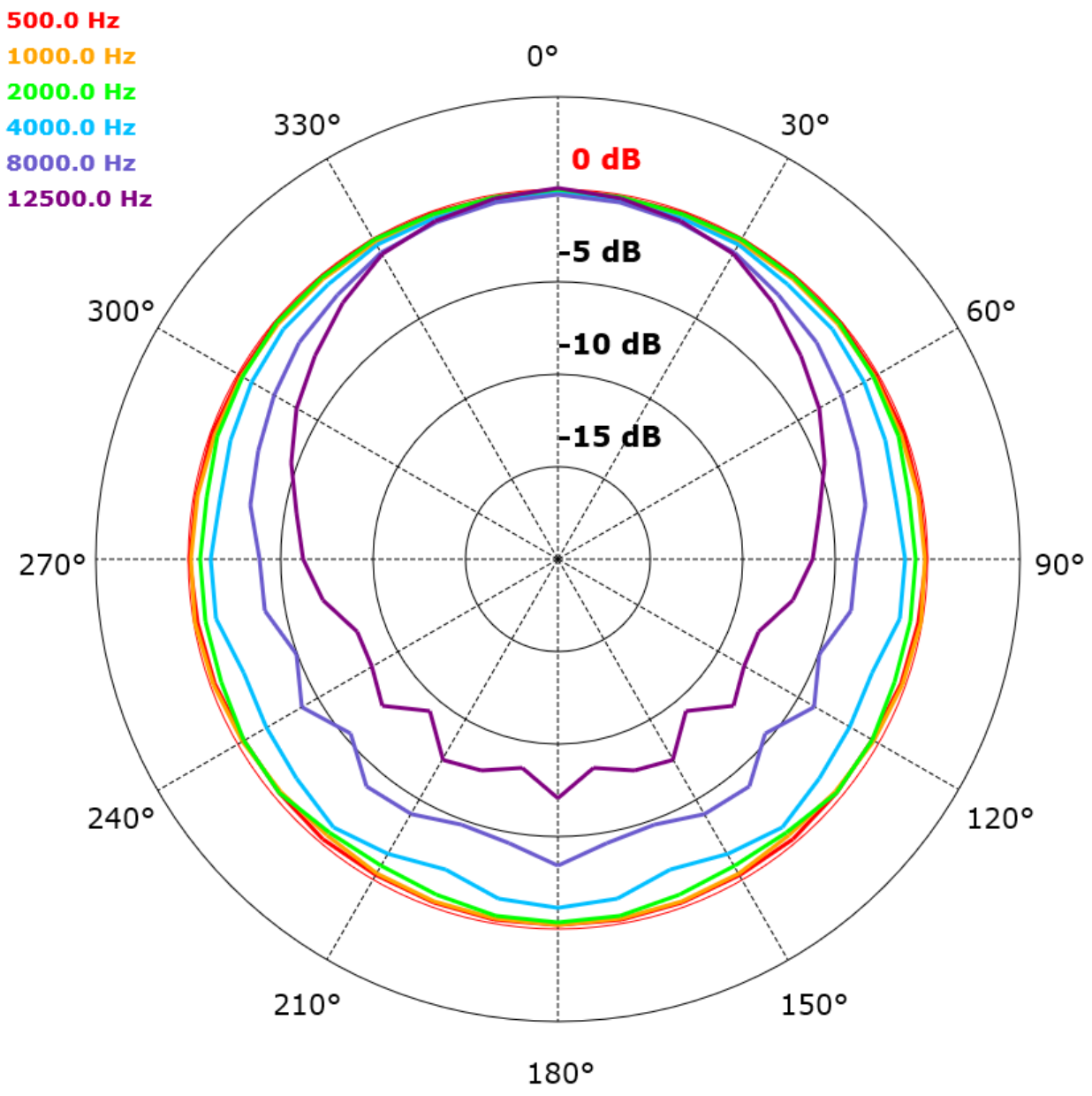
# Section 9

## 9.2.2b – Directional response

The following polar charts are provided for illustrative purposes. For tabular data please see “Appendix 1 – Nova correction data”, page 22.

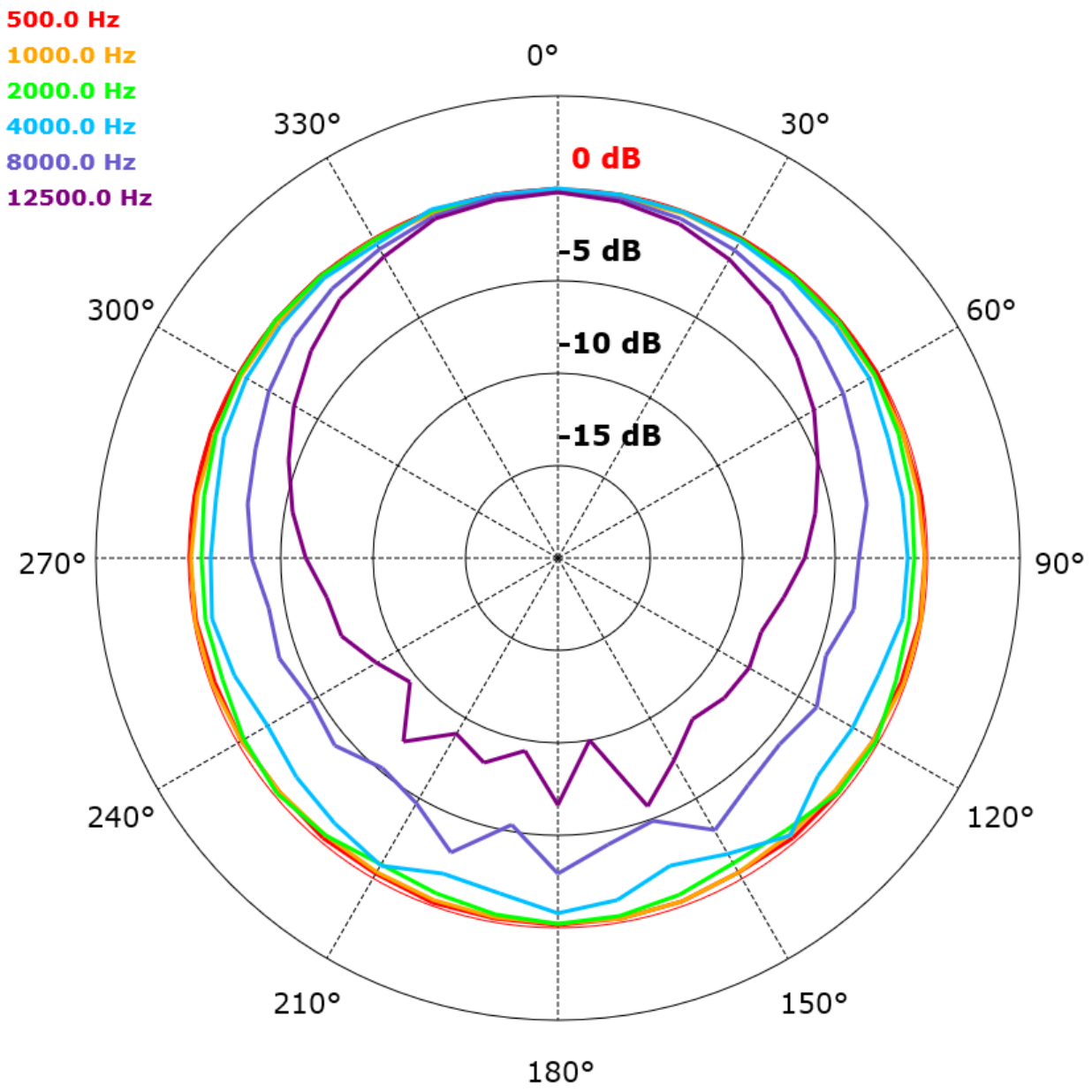
Responses of Nova with typical PM1 microphone capsule – influences of microphone frequency response, reflections and diffraction (symmetrical, angles 350º~190º are equivalent to 10º~170º)

Incidence direction – plane parallel to instrument display screen (horizontal)



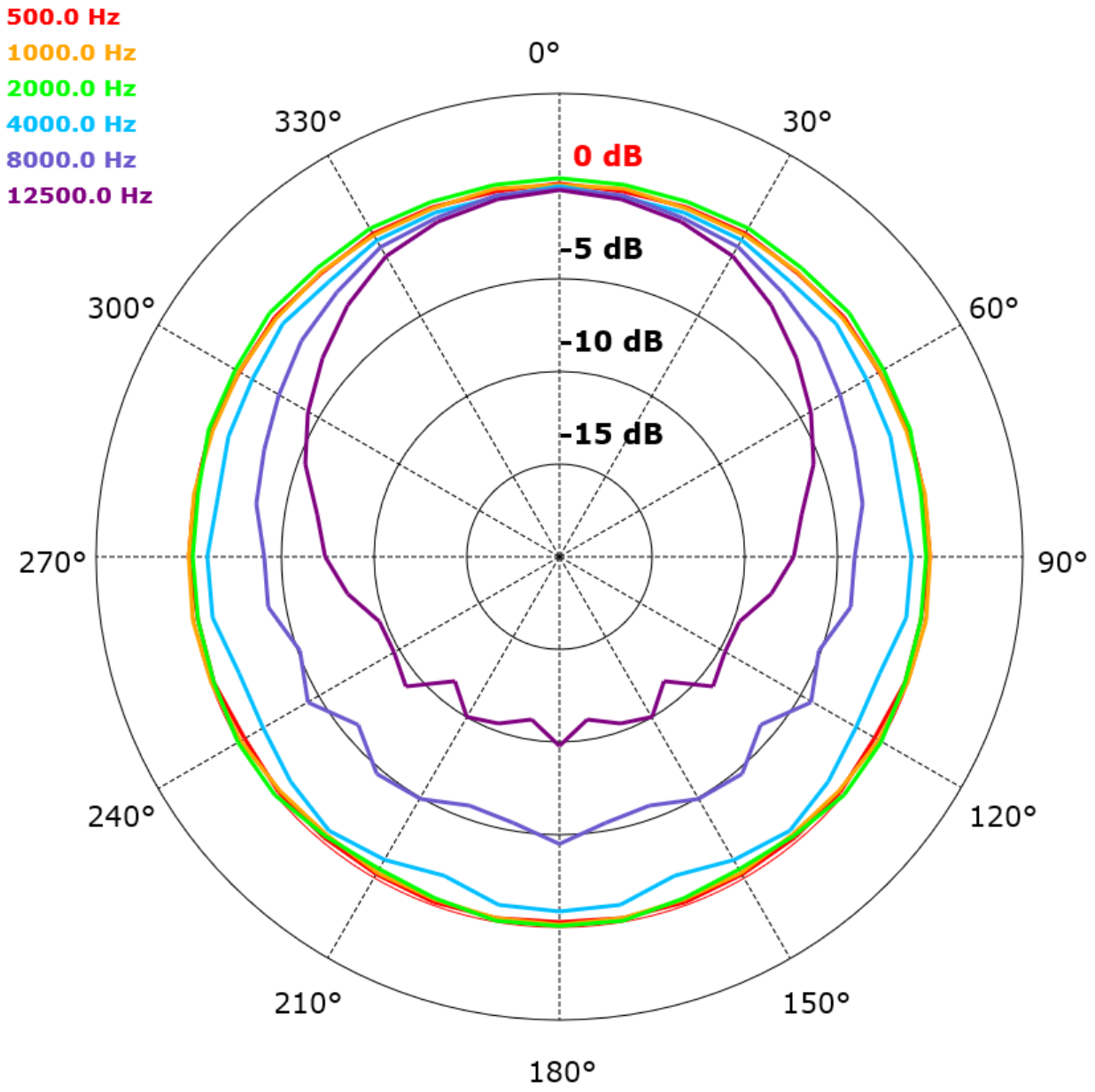
Responses of Nova with typical PM1 microphone capsule – influences of microphone frequency response, reflections and diffraction

Incidence direction – plane perpendicular to instrument display screen (vertical)



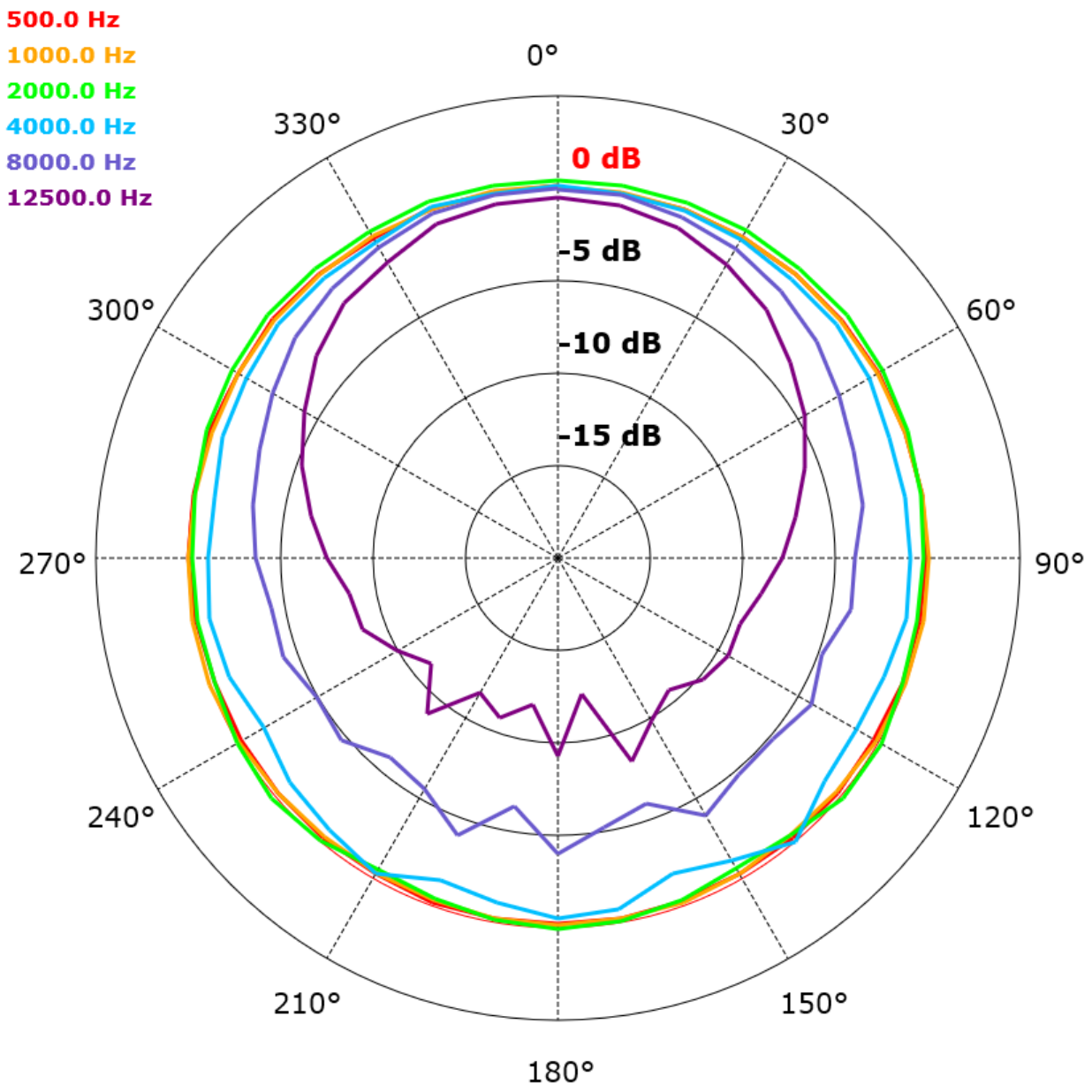
Responses of Nova with typical PM1 microphone capsule with WS90 Windshield – influences of microphone frequency response, reflections and diffraction (symmetrical, angles 350º~190º are equivalent to 10º~170º)

Incidence direction – plane parallel to instrument display screen (horizontal)



Responses of Nova with typical PM1 microphone capsule with WS90 Windshield – influences of microphone frequency response, reflections and diffraction

Incidence direction – plane perpendicular to instrument display screen (vertical)



## 9.2.2c – Frequency weightings

| Nominal frequency (Hz) | Frequency weightings (dB) | | | Acceptance limits (dB) | |
|---|---|---|---|---|---|
| | | | | Class | |
| | A | C | Z | 1 | 2 |
| 10 | -70.4 | -14.3 | 0.0 | +3.0 ; -∞ | +5.0 ; -∞ |
| 12.5 | -63.4 | -11.2 | 0.0 | +2.5 ; -∞ | +5.0 ; -∞ |
| 16 | -56.7 | -8.5 | 0.0 | +2.0 ; -4.0 | +5.0 ; -∞ |
| 20 | -50.5 | -6.2 | 0.0 | ±2.0 | ±3.0 |
| 25 | -44.7 | -4.4 | 0.0 | +2.0 ; -1.5 | ±3.0 |
| 31.5 | -39.4 | -3.0 | 0.0 | ±1.5 | ±3.0 |
| 40 | -34.6 | -2.0 | 0.0 | ±1.0 | ±2.0 |
| 50 | -30.2 | -1.3 | 0.0 | ±1.0 | ±2.0 |
| 63 | -26.2 | -0.8 | 0.0 | ±1.0 | ±2.0 |
| 80 | -22.5 | -0.5 | 0.0 | ±1.0 | ±2.0 |
| 100 | -19.1 | -0.3 | 0.0 | ±1.0 | ±1.5 |
| 125 | -16.1 | -0.2 | 0.0 | ±1.0 | ±1.5 |
| 160 | -13.4 | -0.1 | 0.0 | ±1.0 | ±1.5 |
| 200 | -10.9 | 0.0 | 0.0 | ±1.0 | ±1.5 |
| 250 | -8.6 | 0.0 | 0.0 | ±1.0 | ±1.5 |
| 315 | -6.6 | 0.0 | 0.0 | ±1.0 | ±1.5 |
| 400 | -4.8 | 0.0 | 0.0 | ±1.0 | ±1.5 |
| 500 | -3.2 | 0.0 | 0.0 | ±1.0 | ±1.5 |
| 630 | -1.9 | 0.0 | 0.0 | ±1.0 | ±1.5 |
| 800 | -0.8 | 0.0 | 0.0 | ±1.0 | ±1.5 |
| 1 000 | 0 | 0 | 0 | ±0.7 | ±1.0 |
| 1 250 | 0.6 | 0.0 | 0.0 | ±1.0 | ±1.5 |
| 1 600 | 1.0 | -0.1 | 0.0 | ±1.0 | ±2.0 |
| 2 000 | 1.2 | -0.2 | 0.0 | ±1.0 | ±2.0 |
| 2 500 | 1.3 | -0.3 | 0.0 | ±1.0 | ±2.5 |
| 3 150 | 1.2 | -0.5 | 0.0 | ±1.0 | ±2.5 |
| 4 000 | 1.0 | -0.8 | 0.0 | ±1.0 | ±3.0 |
| 5 000 | 0.5 | -1.3 | 0.0 | ±1.5 | ±3.5 |
| 6 300 | -0.1 | -2.0 | 0.0 | +1.5 ; -2.0 | ±4.5 |
| 8 000 | -1.1 | -3.0 | 0.0 | +1.5 ; -2.5 | ±5.0 |
| 10 000 | -2.5 | -4.4 | 0.0 | +2.0 ; -3.0 | +5.0 ; -∞ |
| 12 500 | -4.3 | -6.2 | 0.0 | +3.0 ; -5.0 | +5.0 ; -∞ |
| 16 000 | -6.6 | -8.5 | 0.0 | +2.5 ; -16.0 | +5.0 ; -∞ |
| 20 000 | -9.3 | -11.2 | 0.0 | +3.0 ; -∞ | +5.0 ; -∞ |

### 9.2.2d – Time weightings

The time constants for the available time weightings are:

Fast: 0.125 s
Slow: 1 s
Impulse: 35 ms

### 9.2.2i – Peak measurement ranges

The Nova measures $L_{APeak}$, $L_{CPeak}$ and $L_{ZPeak}$. $L_{CPeak}$ is mandated by the standard IEC 61672-1:2013 and its range is shown in bold in the table below.

| Frequency | A-weighting | C-weighting | Z-weighting |
|---|---|---|---|
| 31.5 Hz | 40 – 102 dB | 50 – 139 dB | 55 – 142 dB |
| 500 Hz | 40 – 139 dB | 50 – 142 dB | 55 – 142 dB |
| 1 kHz | 40 – 142 dB | 50 – 142 dB | 55 – 142 dB |
| 4 kHz | 40 – 143 dB | 50 – 141 dB | 55 – 142 dB |
| 8 kHz | 40 – 140 dB | 50 – 138 dB | 55 – 141 dB |
| 12.5 kHz | 40 – 137 dB | 50 – 136 dB | 55 – 141 dB |

Note that the upper limits of the A, C and Z-weighted Peak ranges are 3 dB above the corresponding Sound Level range upper limits as described in section 9.3f below (Page 19). The note in that section regarding the effect of calibration offset also applies to the upper limit of the Peak ranges.

## 9.2.5a – Frequency response corrections

The values in the table below should be subtracted from the measurement reading to correct for the corresponding effect at the reference direction, 0° angle of incidence for plane-progressive sound waves. See "Appendix 1 – Nova correction data", page 22, for detailed correction tables at other angles of incidence.

| Nominal Frequency (Hz) | Exact Frequency (Hz) | Typical PM1 free-field response at 0° (dB) | Free-field influence of Nova case at 0° (dB) | Expanded uncertainties at 95% coverage, k=2 (dB) |
|---|---|---|---|---|
| 63 | 63 | 0.00 | -0.02 | 0.25 |
| 80 | 79 | 0.00 | 0.01 | 0.25 |
| 100 | 99 | 0.00 | 0.05 | 0.25 |
| 125 | 125 | 0.00 | 0.10 | 0.25 |
| 160 | 158 | 0.00 | 0.14 | 0.25 |
| 200 | 198 | 0.00 | 0.17 | 0.25 |
| 250 | 251 | 0.00 | 0.19 | 0.25 |
| 315 | 316 | 0.00 | 0.20 | 0.25 |
| 400 | 398 | 0.00 | 0.20 | 0.25 |
| 500 | 501 | 0.00 | 0.18 | 0.25 |
| 630 | 631 | 0.00 | 0.14 | 0.25 |
| 800 | 794 | 0.00 | 0.06 | 0.25 |
| 1 000 | 1 000 | 0.00 | 0.00 | 0.25 |
| 1 060 | 1 059 | 0.00 | 0.01 | 0.25 |
| 1 120 | 1 122 | 0.00 | 0.03 | 0.25 |
| 1 180 | 1 189 | 0.00 | 0.07 | 0.25 |
| 1 250 | 1 259 | 0.00 | 0.11 | 0.25 |
| 1 320 | 1 334 | 0.00 | 0.16 | 0.25 |
| 1 400 | 1 413 | 0.00 | 0.20 | 0.25 |
| 1 500 | 1 496 | 0.00 | 0.24 | 0.25 |
| 1 600 | 1 585 | 0.00 | 0.26 | 0.25 |
| 1 700 | 1 679 | 0.00 | 0.26 | 0.25 |
| 1 800 | 1 778 | 0.00 | 0.23 | 0.25 |
| 1 900 | 1 884 | 0.00 | 0.18 | 0.25 |
| 2 000 | 1 995 | 0.00 | 0.12 | 0.25 |
| 2 120 | 2 113 | 0.00 | 0.06 | 0.25 |
| 2 240 | 2 239 | 0.00 | 0.01 | 0.25 |
| 2 360 | 2 371 | 0.00 | -0.01 | 0.25 |
| 2 500 | 2 512 | 0.00 | 0.00 | 0.25 |
| 2 650 | 2 661 | 0.00 | 0.06 | 0.25 |
| 2 800 | 2 818 | 0.00 | 0.16 | 0.25 |
| 3 000 | 2 985 | 0.00 | 0.21 | 0.25 |
| 3 150 | 3 162 | 0.00 | 0.17 | 0.25 |
| 3 350 | 3 350 | 0.00 | 0.14 | 0.25 |
| 3 550 | 3 548 | 0.00 | 0.13 | 0.25 |
| 3 750 | 3 758 | 0.00 | 0.14 | 0.25 |
| 4 000 | 3 981 | 0.00 | 0.15 | 0.25 |
| 4 250 | 4 217 | 0.00 | 0.15 | 0.30 |
| 4 500 | 4 467 | 0.00 | 0.15 | 0.30 |
| 4 750 | 4 732 | 0.00 | 0.15 | 0.30 |
| 5 000 | 5 012 | 0.00 | 0.09 | 0.30 |
| 5 300 | 5 309 | 0.00 | 0.03 | 0.30 |
| 5 600 | 5 623 | 0.00 | 0.06 | 0.30 |
| 6 000 | 5 957 | 0.00 | 0.12 | 0.30 |
| 6 300 | 6 310 | 0.00 | 0.15 | 0.30 |
| 6 700 | 6 683 | 0.00 | 0.05 | 0.30 |
| 7 100 | 7 079 | 0.00 | -0.01 | 0.30 |
| 7 500 | 7 499 | 0.00 | 0.01 | 0.30 |
| 8 000 | 7 943 | 0.00 | -0.10 | 0.30 |
| 8 500 | 8 414 | 0.00 | -0.01 | 0.30 |
| 9 000 | 8 913 | 0.00 | 0.03 | 0.30 |
| 9 500 | 9 441 | 0.00 | 0.16 | 0.30 |
| 10 000 | 10 000 | 0.10 | 0.22 | 0.30 |
| 10 600 | 10 593 | 0.15 | 0.64 | 0.30 |
| 11 200 | 11 220 | 0.20 | 0.64 | 0.30 |
| 11 800 | 11 885 | 0.25 | 1.16 | 0.30 |
| 12 500 | 12 589 | 0.30 | -0.32 | 0.30 |
| 13 200 | 13 335 | 0.21 | 0.05 | 0.30 |
| 14 000 | 14 125 | 0.12 | -0.20 | 0.30 |
| 15 000 | 14 962 | -0.19 | -0.32 | 0.30 |
| 16 000 | 15 849 | -0.51 | -0.32 | 0.30 |

| Nominal Frequency (Hz) | Exact Frequency (Hz) | Free-field influence of Windshield WS90 at 0° (dB) | Expanded uncertainties at 95% coverage, k=2 (dB) |
|---|---|---|---|
| 63 | 63 | -0.1 | 0.20 |
| 80 | 79 | -0.07 | 0.20 |
| 100 | 99 | -0.03 | 0.20 |
| 125 | 125 | 0.01 | 0.20 |
| 160 | 158 | 0.05 | 0.20 |
| 200 | 198 | 0.08 | 0.20 |
| 250 | 251 | 0.11 | 0.20 |
| 315 | 316 | 0.13 | 0.20 |
| 400 | 398 | 0.15 | 0.20 |
| 500 | 501 | 0.20 | 0.20 |
| 630 | 631 | 0.18 | 0.20 |
| 800 | 794 | 0.21 | 0.20 |
| 1 000 | 1 000 | 0.27 | 0.20 |
| 1 060 | 1 059 | 0.29 | 0.20 |
| 1 120 | 1 122 | 0.31 | 0.20 |
| 1 180 | 1 189 | 0.34 | 0.20 |
| 1 250 | 1 259 | 0.37 | 0.20 |
| 1 320 | 1 334 | 0.38 | 0.20 |
| 1 400 | 1 413 | 0.41 | 0.20 |
| 1 500 | 1 496 | 0.43 | 0.20 |
| 1 600 | 1 585 | 0.46 | 0.20 |
| 1 700 | 1 679 | 0.49 | 0.20 |
| 1 800 | 1 778 | 0.52 | 0.20 |
| 1 900 | 1 884 | 0.54 | 0.20 |
| 2 000 | 1 995 | 0.55 | 0.20 |
| 2 120 | 2 113 | 0.55 | 0.20 |
| 2 240 | 2 239 | 0.54 | 0.20 |
| 2 360 | 2 371 | 0.52 | 0.20 |
| 2 500 | 2 512 | 0.49 | 0.20 |
| 2 650 | 2 661 | 0.44 | 0.20 |
| 2 800 | 2 818 | 0.36 | 0.20 |
| 3 000 | 2 985 | 0.28 | 0.20 |
| 3 150 | 3 162 | 0.24 | 0.20 |
| 3 350 | 3 350 | 0.21 | 0.20 |
| 3 550 | 3 548 | 0.18 | 0.20 |
| 3 750 | 3 758 | 0.16 | 0.20 |
| 4 000 | 3 981 | 0.14 | 0.20 |
| 4 250 | 4 217 | 0.14 | 0.30 |
| 4 500 | 4 467 | 0.16 | 0.30 |
| 4 750 | 4 732 | 0.18 | 0.30 |
| 5 000 | 5 012 | 0.21 | 0.30 |
| 5 300 | 5 309 | 0.20 | 0.30 |
| 5 600 | 5 623 | 0.16 | 0.30 |
| 6 000 | 5 957 | 0.11 | 0.30 |
| 6 300 | 6 310 | 0.07 | 0.30 |
| 6 700 | 6 683 | 0.06 | 0.30 |
| 7 100 | 7 079 | 0.10 | 0.30 |
| 7 500 | 7 499 | 0.12 | 0.30 |
| 8 000 | 7 943 | 0.15 | 0.30 |
| 8 500 | 8 414 | 0.15 | 0.30 |
| 9 000 | 8 913 | -0.06 | 0.30 |
| 9 500 | 9 441 | -0.20 | 0.30 |
| 10 000 | 10 000 | -0.15 | 0.30 |
| 10 600 | 10 593 | -0.20 | 0.30 |
| 11 200 | 11 220 | -0.20 | 0.30 |
| 11 800 | 11 885 | -0.39 | 0.30 |
| 12 500 | 12 589 | -0.27 | 0.30 |
| 13 200 | 13 335 | -0.25 | 0.30 |
| 14 000 | 14 125 | -0.41 | 0.30 |
| 15 000 | 14 962 | -0.43 | 0.30 |
| 16 000 | 15 849 | -0.40 | 0.30 |

### 9.2.6a – Reference direction

The reference direction, or “0°, head-on incidence”, is perpendicular to the microphone diaphragm and parallel to the length of the preamplifier body.

### 9.2.6b – Observer position

The meter will be either mounted upon a tripod or held in the hand. In order to avoid the effect of sound reflections from the body of the operator interfering with the measurement, the meter should be located as far as possible from the body.

When taking a measurement, the operator should place themselves at a distance behind the tripod-mounted meter, or extend the hand-held meter as far from the body as is possible.

### 9.2.8c – Immunity to a.c. power-frequency and radio-frequency fields

The Nova range conforms to the specifications of IEC 61672-1:2013 for exposure to radio-frequency fields.

### 9.3a – Reference sound pressure level

The reference sound pressure level is 1 Pa (94.0 dB).

### 9.3b – Reference level range

The Nova is a single-range instrument, so the only range is the reference range.

### 9.3c – Microphone reference point

The microphone reference point is the centre of the diaphragm of the PM1 microphone.

### 9.3d – Periodic testing

It is recommended to use multi-frequency acoustic calibrator for Periodic Testing of frequency response. For the B&K Multifunction Acoustic Calibrator type 4226, use the function settings as follows:

Microphone – 'b'
Sound Field – 'Falcon, free-field'

These settings require no additional corrections to obtain A-weighted sound levels equivalent to the response to plane-progressive sound waves from the reference direction at the available frequencies.

### 9.3f – Linear operating range

| Frequency | A-weighting | C-weighting | Z-weighting |
|---|---|---|---|
| 31.5 Hz | 24 – 99 dB | 30 – 136 dB | 45 – 139 dB |
| 500 Hz | 24 – 136 dB | 30 – 139 dB | 45 – 139 dB |
| 1 kHz | 24 – 139 dB | 30 – 139 dB | 45 – 139 dB |
| 4 kHz | 24 – 140 dB | 30 – 138 dB | 45 – 139 dB |
| 8 kHz | 24 – 137 dB | 30 – 135 dB | 45 – 138 dB |
| 12.5 kHz | 24 – 134 dB | 30 – 133 dB | 45 – 138 dB |

(12.5 kHz applies to Class 1 Nova models only)

Note that the upper limits on the linearity range are affected by the calibration offset. Nova instruments are factory-adjusted to a zero calibration offset and will have the upper limits shown above. If a different microphone capsule is fitted or the microphone sensitivity changes, resulting in a negative calibration offset, the upper limits will be reduced by the value of the offset. For example: a calibration offset of -2.0 dB will result in an upper limit of 138 dB at 1 kHz.

## 9.3g – Linear measurement starting level

For testing of level linearity according to IEC 61672-2 and IEC 61672-3 the starting point is not critical and can be selected, within reasonable bounds, at the convenience of the testing laboratory.

Two options are presented in the table below:

Option 1 uses the same electrical signal (input) level at each test frequency;

Option 2 uses the same displayed (output) A-weighted level at each test frequency.

Decibel values in the table below represent the A-weighted Sound Level or Integrated Level shown on the Nova display at each starting level.

| Frequency | Option 1 | Option 2 |
|---|---|---|
| 31.5 Hz | 54.6 dB | 94.0 dB |
| 1 kHz | 94.0 dB | 94.0 dB |
| 4 kHz | 95.0 dB | 94.0 dB |
| 8 kHz | 92.9 dB | 94.0 dB |
| 12.5 kHz | 89.7 dB | 94.0 dB |

Note that decibel levels in Option 1 are stated to a tolerance of ±0.5 dB when a fixed electrical signal level is used.

## 9.3i – Self-generated noise

Highest anticipated self-generated noise in a low-level sound field with microphone capsule type MK:224 fitted:

A-weighted – 19 dB
C-weighted – 25 dB
Z-weighted – 40 dB

Highest anticipated self-generated noise in a low-level sound field with electrical input via 18pF dummy microphone terminated with a 50 Ω load (between signal pin and body):

A-weighted – 15 dB
C-weighted – 24 dB
Z-weighted – 40 dB

Note: the above decibel values are Leq,t measured over 30 seconds.

| | Self-generated noise | | | | |
|---|---|---|---|---|---|
| | $L_{AF}$ | $L_{CF}$ | $L_{ZF}$ | $L_{Aeq}$ | $L_{AE}$ ($t_{int}$ = 30 s) |
| Electric | <16 dB | <24 dB | <40 dB | <16 dB | <31 dB |
| Acoustic | <19 dB | <25 dB | <40 dB | <19 dB | <34 dB |

The instrument's connections for data communication are non-reactive, which means that the displayed value is not affected by either the hardware or the software. Using the microphone extension cable does not require to apply any correction to the reading.

The averaging time for measuring the self-generated noise is at least 30 seconds. It is recommended that Integrated Level (Leq,t) is used.

### 9.3k – Battery voltage range

When powered by 6 x AA primary batteries: maximum 10.2 V, minimum 5.4 V. The instrument automatically shuts down when the battery voltage drops below 6.6 V.

When powered via USB: maximum 5.3 V, minimum 4.7 V.

### 9.3l – Typical stabilization time after changes in environmental conditions

Sudden changes in temperature will affect Nova measurements. This is due to temperature differentials between parts of the analogue circuit and their stabilised power supply circuits. In particular, the self-generated noise will rise.

The instrument must be allowed to stabilize for at least 1 hour after a sudden change in temperature of more than 5 ºC.

Sudden changes in barometric pressure will also affect measurements. (This is due to pressure equalization in the microphone capsule, which is vented via the preamplifier into the instrument body or cable back-shell. In particular the low frequency response and absolute sensitivity will be affected.)

The instrument must be allowed to stabilize for at least 10 minutes after a sudden change in barometric pressure of more than 5 kPa.

### 9.3m – Field strength >10 V/m

Not applicable. The Nova conforms to the specifications of IEC 61672-1:2013 for electric field strengths up to and including 10 V/m.

### 9.3n – Radio-frequency emissions

No mode of operation or configuration produces radio-frequency emissions significantly greater than any other. However, for reference purposes the worst-case configuration for testing is with the plane of electric field perpendicular to the centre of the display.

### 9.3o – A.C. power-frequency and radio-frequency susceptibility

The operating mode of the meter (display mode, storage, settings, etc.) has no effect on susceptibility to radio frequency and a.c. power-frequency fields.

The configuration with the greatest susceptibility to radio-frequency fields is with PSR205 microphone extension cable fitted, USB data cable fitted, the Nova case vertical with display facing the radio transmitter, and vertically polarised electrical field.

The configuration with the greatest susceptibility to a.c. power fields is with the axis of the field-generating coil passing through the centre of the meter's display and exiting through the centre of the back of the case.

# Appendix 1 – Nova correction data

The values in the tables below need to be subtracted from the measurement reading to correct for the corresponding effect.

Uncertainty figures for all tables below are as stated above in the table page 17.

# Influence of reflections and diffraction on the frequency response of a typical PM1 microphone (relative to 0°) - 0° to 110°

| Nominal Frequency (Hz) | Exact Frequency (Hz) | Angle from reference direction | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0° | 10° | 20° | 30° | 40° | 50° | 60° | 70° | 80° | 90° | 100° | 110° |
| 63 | 63 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 80 | 79 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 100 | 99 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 125 | 125 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 160 | 158 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 200 | 198 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 250 | 251 | 0.00 | -0.02 | -0.02 | -0.02 | 0.01 | 0.00 | -0.02 | -0.03 | -0.05 | -0.05 | -0.06 | -0.07 |
| 315 | 316 | 0.00 | -0.02 | -0.02 | -0.02 | 0.01 | 0.00 | -0.02 | -0.03 | -0.05 | -0.05 | -0.07 | -0.08 |
| 400 | 398 | 0.00 | -0.03 | -0.02 | -0.02 | 0.00 | -0.01 | -0.02 | -0.03 | -0.05 | -0.06 | -0.08 | -0.09 |
| 500 | 501 | 0.00 | -0.02 | -0.02 | -0.02 | 0.00 | -0.01 | -0.03 | -0.04 | -0.06 | -0.07 | -0.09 | -0.11 |
| 630 | 631 | 0.00 | -0.02 | -0.01 | -0.02 | -0.02 | -0.03 | -0.04 | -0.06 | -0.08 | -0.09 | -0.11 | -0.12 |
| 800 | 794 | 0.00 | -0.01 | -0.01 | -0.02 | -0.03 | -0.05 | -0.06 | -0.09 | -0.11 | -0.13 | -0.14 | -0.15 |
| 1 000 | 1 000 | 0.00 | -0.01 | -0.01 | -0.02 | -0.04 | -0.07 | -0.09 | -0.12 | -0.14 | -0.17 | -0.19 | -0.20 |
| 1 060 | 1 059 | 0.00 | -0.01 | -0.02 | -0.03 | -0.04 | -0.07 | -0.10 | -0.13 | -0.15 | -0.18 | -0.21 | -0.21 |
| 1 120 | 1 122 | 0.00 | -0.01 | -0.02 | -0.03 | -0.04 | -0.07 | -0.10 | -0.13 | -0.16 | -0.19 | -0.22 | -0.22 |
| 1 180 | 1 189 | 0.00 | -0.01 | -0.03 | -0.03 | -0.04 | -0.08 | -0.10 | -0.14 | -0.16 | -0.20 | -0.23 | -0.24 |
| 1 250 | 1 259 | 0.00 | -0.01 | -0.03 | -0.04 | -0.05 | -0.08 | -0.11 | -0.14 | -0.17 | -0.21 | -0.25 | -0.25 |
| 1 320 | 1 334 | 0.00 | -0.02 | -0.03 | -0.04 | -0.05 | -0.09 | -0.12 | -0.15 | -0.19 | -0.22 | -0.26 | -0.27 |
| 1 400 | 1 413 | 0.00 | -0.02 | -0.04 | -0.05 | -0.05 | -0.09 | -0.13 | -0.16 | -0.20 | -0.24 | -0.28 | -0.29 |
| 1 500 | 1 496 | 0.00 | -0.01 | -0.04 | -0.05 | -0.06 | -0.10 | -0.14 | -0.18 | -0.22 | -0.26 | -0.30 | -0.31 |
| 1 600 | 1 585 | 0.00 | -0.01 | -0.04 | -0.05 | -0.07 | -0.12 | -0.15 | -0.19 | -0.24 | -0.28 | -0.32 | -0.33 |
| 1 700 | 1 679 | 0.00 | -0.01 | -0.04 | -0.06 | -0.09 | -0.13 | -0.17 | -0.22 | -0.26 | -0.30 | -0.35 | -0.36 |
| 1 800 | 1 778 | 0.00 | -0.01 | -0.04 | -0.06 | -0.10 | -0.15 | -0.20 | -0.24 | -0.29 | -0.33 | -0.38 | -0.40 |
| 1 900 | 1 884 | 0.00 | -0.02 | -0.04 | -0.07 | -0.11 | -0.17 | -0.22 | -0.27 | -0.32 | -0.37 | -0.41 | -0.44 |
| 2 000 | 1 995 | 0.00 | -0.02 | -0.04 | -0.08 | -0.13 | -0.19 | -0.25 | -0.30 | -0.36 | -0.40 | -0.45 | -0.48 |
| 2 120 | 2 113 | 0.00 | -0.02 | -0.05 | -0.08 | -0.14 | -0.22 | -0.28 | -0.34 | -0.39 | -0.44 | -0.49 | -0.52 |
| 2 240 | 2 239 | 0.00 | -0.02 | -0.04 | -0.09 | -0.16 | -0.24 | -0.31 | -0.37 | -0.43 | -0.48 | -0.54 | -0.57 |
| 2 360 | 2 371 | 0.00 | -0.01 | -0.04 | -0.09 | -0.17 | -0.26 | -0.34 | -0.41 | -0.47 | -0.53 | -0.58 | -0.61 |
| 2 500 | 2 512 | 0.00 | 0.00 | -0.03 | -0.08 | -0.18 | -0.28 | -0.37 | -0.45 | -0.51 | -0.57 | -0.62 | -0.65 |
| 2 650 | 2 661 | 0.00 | 0.03 | -0.02 | -0.06 | -0.19 | -0.30 | -0.41 | -0.49 | -0.55 | -0.61 | -0.68 | -0.69 |
| 2 800 | 2 818 | 0.00 | 0.04 | -0.01 | -0.06 | -0.21 | -0.32 | -0.45 | -0.54 | -0.63 | -0.70 | -0.79 | -0.78 |
| 3 000 | 2 985 | 0.00 | 0.01 | -0.05 | -0.11 | -0.23 | -0.35 | -0.48 | -0.60 | -0.72 | -0.82 | -0.92 | -0.93 |
| 3 150 | 3 162 | 0.00 | -0.03 | -0.08 | -0.16 | -0.25 | -0.37 | -0.50 | -0.64 | -0.79 | -0.92 | -1.01 | -1.06 |
| 3 350 | 3 350 | 0.00 | -0.05 | -0.09 | -0.18 | -0.27 | -0.40 | -0.53 | -0.67 | -0.84 | -0.99 | -1.09 | -1.15 |
| 3 550 | 3 548 | 0.00 | -0.06 | -0.10 | -0.20 | -0.29 | -0.43 | -0.56 | -0.71 | -0.88 | -1.05 | -1.16 | -1.23 |
| 3 750 | 3 758 | 0.00 | -0.06 | -0.11 | -0.20 | -0.30 | -0.46 | -0.61 | -0.76 | -0.92 | -1.11 | -1.23 | -1.31 |
| 4 000 | 3 981 | 0.00 | -0.05 | -0.10 | -0.21 | -0.32 | -0.50 | -0.66 | -0.81 | -0.98 | -1.18 | -1.31 | -1.39 |
| 4 250 | 4 217 | 0.00 | -0.04 | -0.10 | -0.21 | -0.33 | -0.54 | -0.73 | -0.89 | -1.06 | -1.26 | -1.42 | -1.50 |
| 4 500 | 4 467 | 0.00 | -0.03 | -0.10 | -0.22 | -0.36 | -0.57 | -0.80 | -1.00 | -1.16 | -1.36 | -1.55 | -1.63 |
| 4 750 | 4 732 | 0.00 | -0.02 | -0.11 | -0.24 | -0.40 | -0.62 | -0.87 | -1.11 | -1.30 | -1.49 | -1.70 | -1.79 |
| 5 000 | 5 012 | 0.00 | -0.02 | -0.13 | -0.27 | -0.46 | -0.69 | -0.96 | -1.23 | -1.47 | -1.65 | -1.86 | -1.98 |
| 5 300 | 5 309 | 0.00 | -0.02 | -0.15 | -0.32 | -0.55 | -0.80 | -1.06 | -1.36 | -1.64 | -1.83 | -2.04 | -2.21 |
| 5 600 | 5 623 | 0.00 | -0.01 | -0.14 | -0.34 | -0.62 | -0.91 | -1.18 | -1.49 | -1.81 | -2.05 | -2.26 | -2.46 |
| 6 000 | 5 957 | 0.00 | -0.03 | -0.14 | -0.33 | -0.61 | -0.97 | -1.27 | -1.57 | -1.90 | -2.20 | -2.43 | -2.66 |
| 6 300 | 6 310 | 0.00 | -0.05 | -0.18 | -0.36 | -0.62 | -1.01 | -1.37 | -1.68 | -2.02 | -2.37 | -2.63 | -2.85 |
| 6 700 | 6 683 | 0.00 | -0.07 | -0.23 | -0.45 | -0.72 | -1.11 | -1.51 | -1.87 | -2.21 | -2.59 | -2.89 | -3.09 |
| 7 100 | 7 079 | 0.00 | -0.07 | -0.24 | -0.52 | -0.84 | -1.23 | -1.65 | -2.07 | -2.43 | -2.82 | -3.18 | -3.36 |
| 7 500 | 7 499 | 0.00 | -0.07 | -0.24 | -0.50 | -0.90 | -1.35 | -1.76 | -2.25 | -2.64 | -3.04 | -3.45 | -3.64 |
| 8 000 | 7 943 | 0.00 | -0.08 | -0.28 | -0.53 | -0.92 | -1.48 | -1.91 | -2.42 | -2.89 | -3.30 | -3.75 | -3.95 |
| 8 500 | 8 414 | 0.00 | -0.09 | -0.33 | -0.63 | -1.00 | -1.59 | -2.11 | -2.60 | -3.15 | -3.57 | -4.05 | -4.28 |
| 9 000 | 8 913 | 0.00 | -0.07 | -0.30 | -0.67 | -1.13 | -1.68 | -2.30 | -2.81 | -3.40 | -3.87 | -4.35 | -4.64 |
| 9 500 | 9 441 | 0.00 | -0.07 | -0.29 | -0.62 | -1.14 | -1.78 | -2.36 | -3.03 | -3.58 | -4.16 | -4.64 | -5.00 |
| 10 000 | 10 000 | 0.00 | -0.10 | -0.38 | -0.73 | -1.19 | -1.96 | -2.54 | -3.30 | -3.86 | -4.53 | -5.03 | -5.44 |
| 10 600 | 10 593 | 0.00 | -0.09 | -0.39 | -0.80 | -1.34 | -2.09 | -2.81 | -3.52 | -4.20 | -4.89 | -5.43 | -5.87 |
| 11 200 | 11 220 | 0.00 | -0.08 | -0.35 | -0.75 | -1.41 | -2.19 | -2.97 | -3.70 | -4.57 | -5.19 | -5.87 | -6.33 |
| 11 800 | 11 885 | 0.00 | -0.11 | -0.44 | -0.87 | -1.56 | -2.46 | -3.22 | -4.16 | -4.95 | -5.70 | -6.43 | -6.86 |
| 12 500 | 12 589 | 0.00 | -0.12 | -0.44 | -0.95 | -1.69 | -2.60 | -3.52 | -4.48 | -5.36 | -6.28 | -7.06 | -7.52 |
| 13 200 | 13 335 | 0.00 | -0.16 | -0.54 | -1.03 | -1.83 | -2.81 | -3.81 | -4.79 | -5.86 | -6.82 | -7.61 | -8.14 |
| 14 000 | 14 125 | 0.00 | -0.17 | -0.57 | -1.18 | -1.98 | -3.10 | -4.10 | -5.25 | -6.40 | -7.35 | -8.24 | -8.89 |
| 15 000 | 14 962 | 0.00 | -0.21 | -0.66 | -1.25 | -2.22 | -3.32 | -4.46 | -5.71 | -6.87 | -7.93 | -8.94 | -9.72 |
| 16 000 | 15 849 | 0.00 | -0.23 | -0.72 | -1.41 | -2.38 | -3.65 | -4.88 | -6.10 | -7.45 | -8.70 | -9.81 | -10.63 |

# Influence of reflections and diffraction on the frequency response of a typical PM1 microphone (relative to 0°) - 120° to 230°

| Nominal Frequency (Hz) | Exact Frequency (Hz) | Angle from reference direction | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 120° | 130° | 140° | 150° | 160° | 170° | 180° | 190° | 200° | 210° | 220° | 230° |
| 63 | 63 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 80 | 79 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 100 | 99 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 125 | 125 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 160 | 158 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 200 | 198 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 250 | 251 | -0.10 | -0.07 | -0.06 | -0.09 | -0.08 | -0.09 | -0.09 | -0.09 | -0.10 | -0.10 | -0.14 | -0.11 |
| 315 | 316 | -0.12 | -0.08 | -0.06 | -0.10 | -0.07 | -0.09 | -0.10 | -0.10 | -0.11 | -0.11 | -0.16 | -0.12 |
| 400 | 398 | -0.13 | -0.08 | -0.06 | -0.10 | -0.08 | -0.09 | -0.10 | -0.10 | -0.12 | -0.12 | -0.17 | -0.13 |
| 500 | 501 | -0.13 | -0.09 | -0.08 | -0.10 | -0.08 | -0.10 | -0.11 | -0.11 | -0.12 | -0.13 | -0.17 | -0.14 |
| 630 | 631 | -0.13 | -0.11 | -0.10 | -0.11 | -0.10 | -0.11 | -0.11 | -0.12 | -0.13 | -0.14 | -0.16 | -0.15 |
| 800 | 794 | -0.14 | -0.14 | -0.14 | -0.13 | -0.13 | -0.13 | -0.12 | -0.14 | -0.15 | -0.16 | -0.17 | -0.18 |
| 1 000 | 1 000 | -0.21 | -0.18 | -0.18 | -0.18 | -0.16 | -0.17 | -0.15 | -0.17 | -0.19 | -0.21 | -0.21 | -0.23 |
| 1 060 | 1 059 | -0.24 | -0.20 | -0.19 | -0.19 | -0.17 | -0.17 | -0.16 | -0.18 | -0.20 | -0.22 | -0.23 | -0.25 |
| 1 120 | 1 122 | -0.26 | -0.21 | -0.20 | -0.21 | -0.18 | -0.18 | -0.18 | -0.19 | -0.21 | -0.24 | -0.25 | -0.27 |
| 1 180 | 1 189 | -0.29 | -0.22 | -0.21 | -0.22 | -0.19 | -0.19 | -0.19 | -0.20 | -0.23 | -0.25 | -0.27 | -0.29 |
| 1 250 | 1 259 | -0.31 | -0.24 | -0.22 | -0.24 | -0.20 | -0.20 | -0.20 | -0.21 | -0.24 | -0.27 | -0.29 | -0.31 |
| 1 320 | 1 334 | -0.33 | -0.25 | -0.23 | -0.25 | -0.21 | -0.21 | -0.21 | -0.22 | -0.25 | -0.28 | -0.31 | -0.33 |
| 1 400 | 1 413 | -0.35 | -0.27 | -0.25 | -0.27 | -0.22 | -0.22 | -0.22 | -0.23 | -0.27 | -0.30 | -0.32 | -0.35 |
| 1 500 | 1 496 | -0.37 | -0.30 | -0.27 | -0.28 | -0.24 | -0.23 | -0.23 | -0.24 | -0.28 | -0.31 | -0.34 | -0.37 |
| 1 600 | 1 585 | -0.39 | -0.32 | -0.30 | -0.30 | -0.25 | -0.25 | -0.23 | -0.26 | -0.29 | -0.33 | -0.36 | -0.39 |
| 1 700 | 1 679 | -0.41 | -0.35 | -0.33 | -0.32 | -0.28 | -0.27 | -0.24 | -0.27 | -0.31 | -0.36 | -0.39 | -0.42 |
| 1 800 | 1 778 | -0.44 | -0.39 | -0.36 | -0.35 | -0.30 | -0.29 | -0.26 | -0.29 | -0.34 | -0.39 | -0.42 | -0.46 |
| 1 900 | 1 884 | -0.48 | -0.43 | -0.40 | -0.38 | -0.33 | -0.31 | -0.29 | -0.31 | -0.37 | -0.42 | -0.45 | -0.50 |
| 2 000 | 1 995 | -0.52 | -0.47 | -0.44 | -0.41 | -0.36 | -0.33 | -0.33 | -0.33 | -0.40 | -0.46 | -0.49 | -0.54 |
| 2 120 | 2 113 | -0.56 | -0.52 | -0.49 | -0.45 | -0.39 | -0.36 | -0.36 | -0.36 | -0.43 | -0.50 | -0.54 | -0.59 |
| 2 240 | 2 239 | -0.61 | -0.57 | -0.54 | -0.49 | -0.43 | -0.39 | -0.38 | -0.39 | -0.47 | -0.54 | -0.58 | -0.64 |
| 2 360 | 2 371 | -0.65 | -0.62 | -0.59 | -0.54 | -0.47 | -0.42 | -0.40 | -0.43 | -0.51 | -0.59 | -0.62 | -0.69 |
| 2 500 | 2 512 | -0.70 | -0.67 | -0.64 | -0.59 | -0.51 | -0.45 | -0.43 | -0.47 | -0.55 | -0.63 | -0.66 | -0.75 |
| 2 650 | 2 661 | -0.75 | -0.73 | -0.72 | -0.65 | -0.56 | -0.49 | -0.48 | -0.52 | -0.59 | -0.69 | -0.68 | -0.81 |
| 2 800 | 2 818 | -0.85 | -0.84 | -0.84 | -0.76 | -0.65 | -0.58 | -0.58 | -0.60 | -0.68 | -0.79 | -0.77 | -0.91 |
| 3 000 | 2 985 | -0.98 | -0.99 | -0.97 | -0.88 | -0.76 | -0.68 | -0.68 | -0.71 | -0.80 | -0.92 | -0.95 | -1.04 |
| 3 150 | 3 162 | -1.09 | -1.10 | -1.05 | -0.96 | -0.83 | -0.74 | -0.75 | -0.79 | -0.90 | -1.02 | -1.11 | -1.14 |
| 3 350 | 3 350 | -1.17 | -1.18 | -1.11 | -1.03 | -0.89 | -0.79 | -0.80 | -0.85 | -0.97 | -1.10 | -1.23 | -1.22 |
| 3 550 | 3 548 | -1.25 | -1.25 | -1.16 | -1.09 | -0.93 | -0.84 | -0.86 | -0.90 | -1.05 | -1.18 | -1.33 | -1.30 |
| 3 750 | 3 758 | -1.33 | -1.32 | -1.23 | -1.16 | -0.99 | -0.89 | -0.91 | -0.96 | -1.12 | -1.26 | -1.41 | -1.38 |
| 4 000 | 3 981 | -1.42 | -1.40 | -1.31 | -1.24 | -1.06 | -0.94 | -0.96 | -1.03 | -1.19 | -1.35 | -1.50 | -1.47 |
| 4 250 | 4 217 | -1.52 | -1.51 | -1.43 | -1.34 | -1.15 | -1.01 | -1.02 | -1.11 | -1.29 | -1.46 | -1.60 | -1.57 |
| 4 500 | 4 467 | -1.65 | -1.64 | -1.58 | -1.48 | -1.27 | -1.11 | -1.12 | -1.21 | -1.41 | -1.60 | -1.73 | -1.71 |
| 4 750 | 4 732 | -1.80 | -1.81 | -1.77 | -1.63 | -1.42 | -1.22 | -1.23 | -1.33 | -1.54 | -1.76 | -1.88 | -1.88 |
| 5 000 | 5 012 | -1.99 | -2.00 | -1.98 | -1.82 | -1.60 | -1.36 | -1.36 | -1.48 | -1.72 | -1.95 | -2.07 | -2.07 |
| 5 300 | 5 309 | -2.21 | -2.22 | -2.21 | -2.04 | -1.80 | -1.53 | -1.55 | -1.67 | -1.92 | -2.17 | -2.27 | -2.28 |
| 5 600 | 5 623 | -2.47 | -2.49 | -2.49 | -2.31 | -2.04 | -1.75 | -1.74 | -1.89 | -2.17 | -2.42 | -2.51 | -2.54 |
| 6 000 | 5 957 | -2.73 | -2.70 | -2.67 | -2.55 | -2.23 | -1.94 | -1.97 | -2.08 | -2.40 | -2.66 | -2.75 | -2.77 |
| 6 300 | 6 310 | -2.99 | -2.91 | -2.86 | -2.77 | -2.41 | -2.12 | -2.14 | -2.28 | -2.63 | -2.90 | -2.99 | -3.02 |
| 6 700 | 6 683 | -3.30 | -3.19 | -3.12 | -3.05 | -2.67 | -2.35 | -2.37 | -2.52 | -2.91 | -3.20 | -3.28 | -3.34 |
| 7 100 | 7 079 | -3.60 | -3.51 | -3.41 | -3.35 | -2.95 | -2.60 | -2.60 | -2.78 | -3.22 | -3.50 | -3.58 | -3.66 |
| 7 500 | 7 499 | -3.91 | -3.83 | -3.70 | -3.65 | -3.23 | -2.84 | -2.84 | -3.04 | -3.52 | -3.81 | -3.88 | -4.00 |
| 8 000 | 7 943 | -4.22 | -4.19 | -4.02 | -3.99 | -3.54 | -3.11 | -3.08 | -3.32 | -3.85 | -4.14 | -4.20 | -4.36 |
| 8 500 | 8 414 | -4.51 | -4.56 | -4.37 | -4.32 | -3.86 | -3.40 | -3.35 | -3.61 | -4.17 | -4.47 | -4.53 | -4.71 |
| 9 000 | 8 913 | -4.86 | -4.95 | -4.72 | -4.68 | -4.21 | -3.70 | -3.69 | -3.96 | -4.57 | -4.89 | -4.95 | -5.13 |
| 9 500 | 9 441 | -5.22 | -5.33 | -5.06 | -5.03 | -4.55 | -3.98 | -4.02 | -4.28 | -4.94 | -5.24 | -5.32 | -5.48 |
| 10 000 | 10 000 | -5.69 | -5.83 | -5.52 | -5.51 | -5.02 | -4.38 | -4.38 | -4.72 | -5.41 | -5.69 | -5.81 | -5.92 |
| 10 600 | 10 593 | -6.10 | -6.32 | -6.00 | -5.94 | -5.48 | -4.78 | -4.72 | -5.14 | -5.88 | -6.17 | -6.30 | -6.39 |
| 11 200 | 11 220 | -6.58 | -6.77 | -6.51 | -6.41 | -5.95 | -5.27 | -5.19 | -5.69 | -6.46 | -6.72 | -6.91 | -6.94 |
| 11 800 | 11 885 | -7.16 | -7.31 | -7.08 | -6.90 | -6.48 | -5.72 | -5.78 | -6.30 | -7.18 | -7.39 | -7.65 | -7.58 |
| 12 500 | 12 589 | -7.90 | -8.02 | -7.82 | -7.58 | -7.16 | -6.28 | -6.33 | -6.96 | -7.86 | -8.01 | -8.33 | -8.16 |
| 13 200 | 13 335 | -8.58 | -8.69 | -8.54 | -8.21 | -7.76 | -6.79 | -6.76 | -7.49 | -8.39 | -8.49 | -8.85 | -8.64 |
| 14 000 | 14 125 | -9.39 | -9.49 | -9.43 | -8.96 | -8.53 | -7.44 | -7.37 | -8.16 | -9.04 | -9.12 | -9.54 | -9.27 |
| 15 000 | 14 962 | -10.14 | -10.30 | -10.32 | -9.73 | -9.32 | -8.13 | -8.08 | -8.90 | -9.75 | -9.84 | -10.32 | -10.04 |
| 16 000 | 15 849 | -10.96 | -11.17 | -11.22 | -10.56 | -10.14 | -8.81 | -8.75 | -9.66 | -10.47 | -10.54 | -11.06 | -10.79 |

# Influence of reflections and diffraction on the frequency response of a typical PM1 microphone (relative to 0°) - 240° to 350°

| Nominal Frequency (Hz) | Exact Frequency (Hz) | Angle from reference direction | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 240° | 250° | 260° | 270° | 280° | 290° | 300° | 310° | 320° | 330° | 340° | 350° |
| 63 | 63 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 80 | 79 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 100 | 99 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 125 | 125 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 160 | 158 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 200 | 198 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 250 | 251 | -0.14 | -0.09 | -0.12 | -0.08 | -0.06 | -0.05 | -0.06 | -0.03 | -0.01 | -0.04 | -0.03 | -0.01 |
| 315 | 316 | -0.16 | -0.11 | -0.13 | -0.09 | -0.06 | -0.05 | -0.07 | -0.02 | 0.00 | -0.04 | -0.03 | -0.01 |
| 400 | 398 | -0.17 | -0.12 | -0.15 | -0.10 | -0.08 | -0.06 | -0.07 | -0.02 | -0.01 | -0.05 | -0.03 | -0.01 |
| 500 | 501 | -0.17 | -0.14 | -0.15 | -0.12 | -0.10 | -0.08 | -0.08 | -0.04 | -0.02 | -0.05 | -0.03 | -0.02 |
| 630 | 631 | -0.17 | -0.16 | -0.16 | -0.14 | -0.12 | -0.11 | -0.10 | -0.06 | -0.04 | -0.05 | -0.03 | -0.03 |
| 800 | 794 | -0.18 | -0.19 | -0.18 | -0.18 | -0.16 | -0.14 | -0.12 | -0.09 | -0.07 | -0.05 | -0.04 | -0.04 |
| 1 000 | 1 000 | -0.24 | -0.24 | -0.23 | -0.22 | -0.20 | -0.17 | -0.14 | -0.11 | -0.09 | -0.06 | -0.05 | -0.05 |
| 1 060 | 1 059 | -0.26 | -0.26 | -0.25 | -0.23 | -0.21 | -0.17 | -0.15 | -0.11 | -0.08 | -0.07 | -0.05 | -0.05 |
| 1 120 | 1 122 | -0.28 | -0.28 | -0.27 | -0.24 | -0.21 | -0.18 | -0.16 | -0.11 | -0.08 | -0.07 | -0.05 | -0.05 |
| 1 180 | 1 189 | -0.30 | -0.29 | -0.29 | -0.25 | -0.22 | -0.18 | -0.16 | -0.11 | -0.08 | -0.07 | -0.05 | -0.05 |
| 1 250 | 1 259 | -0.32 | -0.31 | -0.31 | -0.26 | -0.23 | -0.19 | -0.17 | -0.11 | -0.08 | -0.07 | -0.05 | -0.04 |
| 1 320 | 1 334 | -0.34 | -0.32 | -0.32 | -0.27 | -0.24 | -0.19 | -0.17 | -0.12 | -0.08 | -0.07 | -0.05 | -0.04 |
| 1 400 | 1 413 | -0.36 | -0.34 | -0.34 | -0.28 | -0.25 | -0.20 | -0.18 | -0.12 | -0.08 | -0.08 | -0.05 | -0.04 |
| 1 500 | 1 496 | -0.39 | -0.36 | -0.35 | -0.30 | -0.26 | -0.22 | -0.19 | -0.13 | -0.09 | -0.08 | -0.05 | -0.04 |
| 1 600 | 1 585 | -0.41 | -0.38 | -0.37 | -0.32 | -0.28 | -0.24 | -0.21 | -0.15 | -0.10 | -0.09 | -0.06 | -0.05 |
| 1 700 | 1 679 | -0.44 | -0.41 | -0.39 | -0.35 | -0.31 | -0.26 | -0.22 | -0.17 | -0.12 | -0.09 | -0.06 | -0.05 |
| 1 800 | 1 778 | -0.47 | -0.45 | -0.42 | -0.38 | -0.34 | -0.29 | -0.25 | -0.19 | -0.14 | -0.10 | -0.07 | -0.06 |
| 1 900 | 1 884 | -0.51 | -0.48 | -0.45 | -0.41 | -0.37 | -0.32 | -0.27 | -0.21 | -0.15 | -0.11 | -0.07 | -0.06 |
| 2 000 | 1 995 | -0.56 | -0.52 | -0.49 | -0.45 | -0.40 | -0.35 | -0.29 | -0.22 | -0.16 | -0.11 | -0.07 | -0.06 |
| 2 120 | 2 113 | -0.60 | -0.56 | -0.53 | -0.49 | -0.44 | -0.38 | -0.32 | -0.24 | -0.18 | -0.11 | -0.07 | -0.06 |
| 2 240 | 2 239 | -0.64 | -0.60 | -0.57 | -0.53 | -0.48 | -0.42 | -0.34 | -0.26 | -0.19 | -0.12 | -0.07 | -0.05 |
| 2 360 | 2 371 | -0.68 | -0.65 | -0.61 | -0.57 | -0.52 | -0.46 | -0.37 | -0.29 | -0.21 | -0.12 | -0.07 | -0.05 |
| 2 500 | 2 512 | -0.71 | -0.71 | -0.65 | -0.61 | -0.58 | -0.50 | -0.40 | -0.32 | -0.23 | -0.11 | -0.06 | -0.05 |
| 2 650 | 2 661 | -0.73 | -0.78 | -0.69 | -0.67 | -0.65 | -0.56 | -0.42 | -0.36 | -0.28 | -0.11 | -0.06 | -0.06 |
| 2 800 | 2 818 | -0.80 | -0.88 | -0.77 | -0.77 | -0.74 | -0.62 | -0.45 | -0.41 | -0.33 | -0.12 | -0.08 | -0.07 |
| 3 000 | 2 985 | -0.98 | -0.98 | -0.91 | -0.88 | -0.79 | -0.65 | -0.49 | -0.40 | -0.31 | -0.15 | -0.09 | -0.07 |
| 3 150 | 3 162 | -1.13 | -1.07 | -1.04 | -0.96 | -0.83 | -0.67 | -0.53 | -0.39 | -0.28 | -0.18 | -0.10 | -0.05 |
| 3 350 | 3 350 | -1.24 | -1.15 | -1.14 | -1.02 | -0.86 | -0.69 | -0.57 | -0.38 | -0.26 | -0.19 | -0.10 | -0.04 |
| 3 550 | 3 548 | -1.33 | -1.24 | -1.23 | -1.07 | -0.91 | -0.73 | -0.61 | -0.39 | -0.25 | -0.20 | -0.09 | -0.02 |
| 3 750 | 3 758 | -1.41 | -1.33 | -1.32 | -1.12 | -0.96 | -0.78 | -0.65 | -0.41 | -0.25 | -0.20 | -0.08 | -0.01 |
| 4 000 | 3 981 | -1.49 | -1.43 | -1.40 | -1.18 | -1.02 | -0.83 | -0.69 | -0.44 | -0.27 | -0.19 | -0.07 | 0.00 |
| 4 250 | 4 217 | -1.59 | -1.55 | -1.48 | -1.26 | -1.10 | -0.91 | -0.75 | -0.49 | -0.30 | -0.20 | -0.07 | -0.01 |
| 4 500 | 4 467 | -1.72 | -1.69 | -1.59 | -1.38 | -1.21 | -1.01 | -0.81 | -0.55 | -0.36 | -0.23 | -0.11 | -0.04 |
| 4 750 | 4 732 | -1.89 | -1.85 | -1.71 | -1.52 | -1.35 | -1.13 | -0.89 | -0.63 | -0.44 | -0.28 | -0.16 | -0.10 |
| 5 000 | 5 012 | -2.09 | -2.04 | -1.85 | -1.69 | -1.50 | -1.24 | -0.97 | -0.71 | -0.52 | -0.32 | -0.19 | -0.11 |
| 5 300 | 5 309 | -2.31 | -2.23 | -2.01 | -1.87 | -1.65 | -1.35 | -1.05 | -0.79 | -0.59 | -0.35 | -0.19 | -0.10 |
| 5 600 | 5 623 | -2.57 | -2.44 | -2.21 | -2.09 | -1.81 | -1.47 | -1.16 | -0.89 | -0.64 | -0.35 | -0.16 | -0.06 |
| 6 000 | 5 957 | -2.81 | -2.64 | -2.43 | -2.24 | -1.92 | -1.56 | -1.25 | -0.91 | -0.60 | -0.32 | -0.13 | -0.03 |
| 6 300 | 6 310 | -3.05 | -2.85 | -2.66 | -2.41 | -2.06 | -1.69 | -1.37 | -0.95 | -0.61 | -0.37 | -0.18 | -0.06 |
| 6 700 | 6 683 | -3.35 | -3.12 | -2.94 | -2.63 | -2.26 | -1.88 | -1.51 | -1.04 | -0.72 | -0.47 | -0.25 | -0.10 |
| 7 100 | 7 079 | -3.63 | -3.39 | -3.21 | -2.84 | -2.47 | -2.06 | -1.62 | -1.15 | -0.83 | -0.51 | -0.24 | -0.08 |
| 7 500 | 7 499 | -3.92 | -3.68 | -3.46 | -3.05 | -2.68 | -2.20 | -1.72 | -1.27 | -0.86 | -0.50 | -0.23 | -0.09 |
| 8 000 | 7 943 | -4.23 | -4.00 | -3.73 | -3.31 | -2.93 | -2.36 | -1.90 | -1.39 | -0.90 | -0.56 | -0.32 | -0.16 |
| 8 500 | 8 414 | -4.54 | -4.34 | -4.01 | -3.59 | -3.19 | -2.56 | -2.11 | -1.49 | -1.02 | -0.68 | -0.39 | -0.19 |
| 9 000 | 8 913 | -4.93 | -4.74 | -4.33 | -3.93 | -3.43 | -2.80 | -2.26 | -1.58 | -1.15 | -0.69 | -0.33 | -0.13 |
| 9 500 | 9 441 | -5.28 | -5.05 | -4.59 | -4.19 | -3.54 | -2.96 | -2.25 | -1.64 | -1.07 | -0.59 | -0.27 | -0.07 |
| 10 000 | 10 000 | -5.73 | -5.43 | -4.96 | -4.51 | -3.81 | -3.12 | -2.44 | -1.73 | -1.08 | -0.66 | -0.30 | -0.05 |
| 10 600 | 10 593 | -6.20 | -5.88 | -5.39 | -4.85 | -4.21 | -3.34 | -2.72 | -1.86 | -1.27 | -0.74 | -0.31 | -0.04 |
| 11 200 | 11 220 | -6.76 | -6.37 | -5.92 | -5.19 | -4.61 | -3.67 | -2.88 | -2.04 | -1.35 | -0.72 | -0.29 | -0.02 |
| 11 800 | 11 885 | -7.43 | -7.00 | -6.51 | -5.82 | -5.01 | -4.18 | -3.21 | -2.38 | -1.60 | -0.96 | -0.49 | -0.18 |
| 12 500 | 12 589 | -8.04 | -7.48 | -6.86 | -6.29 | -5.32 | -4.29 | -3.45 | -2.41 | -1.65 | -0.97 | -0.47 | -0.17 |
| 13 200 | 13 335 | -8.51 | -7.94 | -7.19 | -6.54 | -5.64 | -4.48 | -3.52 | -2.48 | -1.62 | -0.94 | -0.44 | -0.09 |
| 14 000 | 14 125 | -9.17 | -8.59 | -7.80 | -6.92 | -6.00 | -4.86 | -3.76 | -2.66 | -1.75 | -1.04 | -0.45 | -0.10 |
| 15 000 | 14 962 | -9.86 | -9.22 | -8.50 | -7.54 | -6.39 | -5.19 | -4.10 | -2.85 | -1.91 | -1.10 | -0.52 | -0.14 |
| 16 000 | 15 849 | -10.46 | -9.76 | -8.97 | -8.12 | -6.86 | -5.52 | -4.30 | -3.04 | -1.98 | -1.17 | -0.51 | -0.11 |

## Influence of the Nova case on frequency response – plane parallel to the display screen (Horizontal) 0° to 110° (Note: unit is symmetrical, angles 350º~190º are equivalent to 10º~170º)

| Nominal Frequency (Hz) | Exact Frequency (Hz) | Angle from reference direction | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0° | 10° | 20° | 30° | 40° | 50° | 60° | 70° | 80° | 90° | 100° | 110° |
| 63 | 63 | -0.19 | 0.12 | -0.03 | -0.06 | 0.21 | 0.23 | 0.10 | 0.34 | -0.28 | -0.20 | -0.17 | -0.29 |
| 80 | 79 | -0.16 | 0.10 | -0.03 | -0.05 | 0.18 | 0.18 | 0.08 | 0.27 | -0.25 | -0.17 | -0.15 | -0.26 |
| 100 | 100 | -0.12 | 0.07 | -0.03 | -0.03 | 0.13 | 0.13 | 0.05 | 0.18 | -0.21 | -0.14 | -0.13 | -0.21 |
| 125 | 126 | -0.07 | 0.05 | -0.03 | -0.02 | 0.08 | 0.08 | 0.03 | 0.08 | -0.16 | -0.10 | -0.10 | -0.16 |
| 160 | 159 | -0.04 | 0.02 | -0.02 | 0.00 | 0.04 | 0.03 | 0.00 | 0.00 | -0.12 | -0.07 | -0.08 | -0.12 |
| 200 | 200 | 0.00 | 0.00 | -0.02 | 0.01 | 0.00 | -0.01 | -0.02 | -0.07 | -0.08 | -0.04 | -0.06 | -0.08 |
| 250 | 251 | 0.02 | -0.01 | -0.02 | 0.02 | -0.03 | -0.04 | -0.03 | -0.11 | -0.05 | -0.02 | -0.04 | -0.05 |
| 315 | 316 | 0.03 | -0.02 | -0.02 | 0.02 | -0.05 | -0.05 | -0.03 | -0.12 | -0.02 | -0.01 | -0.03 | -0.03 |
| 400 | 398 | 0.03 | -0.03 | -0.03 | 0.01 | -0.05 | -0.05 | -0.02 | -0.11 | 0.01 | 0.01 | -0.03 | -0.02 |
| 500 | 501 | 0.01 | -0.04 | -0.04 | 0.00 | -0.05 | -0.04 | -0.01 | -0.06 | 0.04 | 0.02 | -0.02 | -0.03 |
| 630 | 631 | -0.04 | -0.05 | -0.06 | -0.03 | -0.04 | -0.03 | 0.00 | 0.00 | 0.06 | 0.05 | -0.01 | -0.03 |
| 800 | 794 | -0.11 | -0.09 | -0.11 | -0.09 | -0.05 | -0.03 | -0.01 | 0.06 | 0.06 | 0.08 | 0.05 | -0.01 |
| 1 000 | 1000 | -0.17 | -0.13 | -0.17 | -0.15 | -0.11 | -0.11 | -0.10 | 0.00 | -0.01 | 0.08 | 0.14 | 0.09 |
| 1 060 | 1059 | -0.16 | -0.13 | -0.17 | -0.16 | -0.13 | -0.13 | -0.13 | -0.05 | -0.04 | 0.07 | 0.15 | 0.12 |
| 1 120 | 1122 | -0.14 | -0.12 | -0.16 | -0.15 | -0.15 | -0.16 | -0.16 | -0.10 | -0.06 | 0.06 | 0.15 | 0.15 |
| 1 180 | 1189 | -0.11 | -0.09 | -0.13 | -0.13 | -0.15 | -0.18 | -0.18 | -0.15 | -0.08 | 0.04 | 0.14 | 0.18 |
| 1 250 | 1259 | -0.06 | -0.06 | -0.10 | -0.10 | -0.15 | -0.19 | -0.20 | -0.19 | -0.10 | 0.02 | 0.13 | 0.19 |
| 1 320 | 1334 | -0.02 | -0.02 | -0.06 | -0.06 | -0.13 | -0.18 | -0.22 | -0.22 | -0.12 | 0.00 | 0.10 | 0.20 |
| 1 400 | 1413 | 0.03 | 0.02 | -0.01 | -0.01 | -0.09 | -0.16 | -0.22 | -0.24 | -0.13 | -0.03 | 0.07 | 0.20 |
| 1 500 | 1496 | 0.07 | 0.06 | 0.04 | 0.04 | -0.03 | -0.12 | -0.21 | -0.25 | -0.15 | -0.05 | 0.03 | 0.18 |
| 1 600 | 1585 | 0.09 | 0.09 | 0.07 | 0.09 | 0.03 | -0.06 | -0.19 | -0.24 | -0.18 | -0.08 | -0.01 | 0.15 |
| 1 700 | 1679 | 0.09 | 0.10 | 0.09 | 0.13 | 0.10 | 0.01 | -0.14 | -0.24 | -0.21 | -0.10 | -0.06 | 0.10 |
| 1 800 | 1778 | 0.06 | 0.07 | 0.07 | 0.13 | 0.13 | 0.08 | -0.07 | -0.22 | -0.25 | -0.12 | -0.09 | 0.04 |
| 1 900 | 1884 | 0.01 | 0.01 | 0.02 | 0.11 | 0.13 | 0.12 | 0.00 | -0.18 | -0.28 | -0.14 | -0.10 | -0.01 |
| 2 000 | 1995 | -0.05 | -0.06 | -0.05 | 0.05 | 0.09 | 0.13 | 0.07 | -0.12 | -0.30 | -0.18 | -0.09 | -0.05 |
| 2 120 | 2114 | -0.11 | -0.13 | -0.12 | -0.01 | 0.03 | 0.10 | 0.12 | -0.02 | -0.29 | -0.24 | -0.09 | -0.08 |
| 2 240 | 2239 | -0.16 | -0.17 | -0.17 | -0.08 | -0.04 | 0.05 | 0.14 | 0.08 | -0.23 | -0.30 | -0.09 | -0.09 |
| 2 360 | 2371 | -0.19 | -0.19 | -0.21 | -0.15 | -0.10 | 0.00 | 0.12 | 0.18 | -0.12 | -0.37 | -0.13 | -0.08 |
| 2 500 | 2512 | -0.18 | -0.16 | -0.21 | -0.20 | -0.16 | -0.06 | 0.08 | 0.24 | 0.05 | -0.40 | -0.23 | -0.06 |
| 2 650 | 2661 | -0.11 | -0.05 | -0.14 | -0.20 | -0.19 | -0.14 | 0.01 | 0.24 | 0.22 | -0.31 | -0.45 | -0.03 |
| 2 800 | 2818 | -0.01 | 0.10 | -0.01 | -0.09 | -0.12 | -0.20 | -0.11 | 0.17 | 0.27 | 0.00 | -0.78 | -0.09 |
| 3 000 | 2985 | 0.04 | 0.13 | 0.05 | 0.03 | 0.01 | -0.17 | -0.28 | -0.02 | 0.13 | 0.28 | -0.80 | -0.33 |
| 3 150 | 3162 | 0.00 | 0.01 | -0.01 | 0.04 | 0.00 | -0.11 | -0.30 | -0.21 | 0.04 | 0.28 | -0.44 | -0.55 |
| 3 350 | 3350 | -0.03 | -0.08 | -0.08 | 0.02 | -0.04 | -0.08 | -0.22 | -0.32 | 0.02 | 0.22 | -0.13 | -0.61 |
| 3 550 | 3548 | -0.04 | -0.13 | -0.11 | -0.01 | -0.07 | -0.06 | -0.13 | -0.34 | -0.02 | 0.20 | 0.09 | -0.57 |
| 3 750 | 3758 | -0.03 | -0.12 | -0.11 | -0.02 | -0.10 | -0.04 | -0.04 | -0.30 | -0.07 | 0.19 | 0.23 | -0.46 |
| 4 000 | 3981 | -0.03 | -0.11 | -0.10 | -0.02 | -0.11 | -0.02 | 0.04 | -0.21 | -0.12 | 0.16 | 0.31 | -0.30 |
| 4 250 | 4217 | -0.03 | -0.08 | -0.10 | -0.04 | -0.11 | -0.04 | 0.08 | -0.09 | -0.17 | 0.07 | 0.35 | -0.12 |
| 4 500 | 4467 | -0.02 | -0.05 | -0.09 | -0.08 | -0.15 | -0.09 | 0.05 | 0.03 | -0.18 | -0.10 | 0.35 | 0.03 |
| 4 750 | 4732 | -0.02 | 0.00 | -0.03 | -0.03 | -0.16 | -0.14 | -0.02 | 0.13 | -0.13 | -0.27 | 0.33 | 0.17 |
| 5 000 | 5012 | -0.09 | -0.04 | -0.04 | 0.04 | -0.04 | -0.18 | -0.11 | 0.15 | 0.01 | -0.35 | 0.22 | 0.30 |
| 5 300 | 5309 | -0.15 | -0.11 | -0.13 | -0.04 | 0.02 | -0.06 | -0.25 | 0.07 | 0.13 | -0.33 | 0.02 | 0.42 |
| 5 600 | 5623 | -0.11 | -0.08 | -0.14 | -0.11 | -0.06 | 0.09 | -0.19 | -0.04 | 0.16 | -0.16 | -0.21 | 0.46 |
| 6 000 | 5957 | -0.05 | -0.04 | -0.11 | -0.12 | -0.18 | 0.00 | 0.01 | -0.23 | 0.11 | 0.07 | -0.47 | 0.38 |
| 6 300 | 6310 | -0.02 | -0.02 | -0.07 | -0.07 | -0.22 | -0.14 | 0.04 | -0.20 | -0.06 | 0.17 | -0.66 | 0.26 |
| 6 700 | 6683 | -0.12 | -0.12 | -0.16 | -0.12 | -0.26 | -0.29 | -0.15 | -0.10 | -0.35 | 0.17 | -0.62 | 0.07 |
| 7 100 | 7080 | -0.18 | -0.18 | -0.17 | -0.08 | -0.21 | -0.21 | -0.25 | 0.00 | -0.36 | 0.11 | -0.36 | -0.22 |
| 7 500 | 7499 | -0.16 | -0.20 | -0.28 | -0.20 | -0.26 | -0.18 | -0.32 | -0.11 | -0.24 | -0.19 | -0.20 | -0.64 |
| 8 000 | 7943 | -0.27 | -0.29 | -0.34 | -0.33 | -0.49 | -0.31 | -0.35 | -0.42 | -0.11 | -0.48 | -0.02 | -0.91 |
| 8 500 | 8414 | -0.19 | -0.17 | -0.18 | -0.10 | -0.28 | -0.23 | -0.11 | -0.27 | 0.06 | -0.53 | 0.28 | -0.72 |
| 9 000 | 8913 | -0.14 | -0.18 | -0.19 | -0.03 | -0.17 | -0.18 | -0.12 | -0.06 | -0.07 | -0.12 | 0.14 | -0.31 |
| 9 500 | 9441 | -0.01 | -0.09 | -0.16 | -0.13 | -0.25 | -0.14 | -0.26 | -0.02 | -0.38 | 0.21 | -0.21 | 0.03 |
| 10 000 | 10000 | 0.05 | -0.06 | 0.01 | 0.04 | -0.30 | -0.07 | -0.19 | -0.03 | -0.25 | 0.40 | -0.51 | 0.42 |
| 10 600 | 10593 | 0.46 | 0.33 | 0.32 | 0.47 | 0.24 | 0.28 | 0.38 | 0.33 | 0.41 | 0.49 | -0.44 | 1.05 |
| 11 200 | 11220 | 0.47 | 0.38 | 0.34 | 0.29 | 0.11 | 0.22 | 0.21 | 0.27 | 0.36 | -0.23 | 0.14 | 0.82 |
| 11 800 | 11885 | 0.99 | 1.12 | 1.19 | 1.16 | 0.85 | 1.24 | 0.99 | 1.34 | 0.87 | 0.85 | 1.59 | 0.68 |
| 12 500 | 12589 | -0.50 | -0.59 | -0.66 | -0.61 | -0.83 | -0.88 | -0.71 | -0.77 | -0.85 | -0.45 | -0.49 | -1.36 |
| 13 200 | 13335 | -0.12 | -0.18 | -0.17 | -0.11 | -0.48 | -0.31 | -0.36 | -0.34 | -0.24 | -0.11 | -0.57 | -0.97 |
| 14 000 | 14125 | -0.38 | -0.52 | -0.59 | -0.42 | -0.73 | -0.68 | -0.73 | -0.51 | -0.59 | -0.78 | -1.19 | -0.66 |
| 15 000 | 14962 | -0.49 | -0.57 | -0.53 | -0.48 | -0.79 | -0.75 | -0.66 | -0.62 | -0.89 | -0.86 | -1.00 | -0.20 |
| 16 000 | 15849 | -0.49 | -0.64 | -0.73 | -0.58 | -0.91 | -0.87 | -0.93 | -0.82 | -0.85 | -0.57 | -0.60 | -0.32 |

## Influence of the Nova case on frequency response – plane parallel to the display screen (Horizontal) 120° to 180° (Note: unit is symmetrical, angles 350º~190º are equivalent to 10º~170º)

| Nominal Frequency (Hz) | Exact Frequency (Hz) | Angle from reference direction | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 110° | 120° | 130° | 140° | 150° | 160° | 170° | 180° |
| 63 | 63 | -0.29 | 0.12 | 0.27 | -0.14 | 0.31 | -0.01 | 0.01 | -0.20 |
| 80 | 79 | -0.26 | 0.09 | 0.21 | -0.13 | 0.24 | -0.02 | 0.00 | -0.17 |
| 100 | 100 | -0.21 | 0.04 | 0.13 | -0.12 | 0.16 | -0.03 | -0.01 | -0.14 |
| 125 | 126 | -0.16 | 0.00 | 0.05 | -0.11 | 0.07 | -0.04 | -0.02 | -0.10 |
| 160 | 159 | -0.12 | -0.05 | -0.03 | -0.10 | -0.01 | -0.05 | -0.03 | -0.07 |
| 200 | 200 | -0.08 | -0.09 | -0.10 | -0.10 | -0.08 | -0.06 | -0.04 | -0.04 |
| 250 | 251 | -0.05 | -0.12 | -0.15 | -0.09 | -0.13 | -0.07 | -0.04 | -0.02 |
| 315 | 316 | -0.03 | -0.14 | -0.18 | -0.09 | -0.16 | -0.07 | -0.05 | -0.01 |
| 400 | 398 | -0.02 | -0.15 | -0.20 | -0.10 | -0.18 | -0.08 | -0.05 | -0.01 |
| 500 | 501 | -0.03 | -0.15 | -0.20 | -0.11 | -0.18 | -0.08 | -0.05 | -0.01 |
| 630 | 631 | -0.03 | -0.14 | -0.19 | -0.14 | -0.16 | -0.08 | -0.05 | -0.03 |
| 800 | 794 | -0.01 | -0.09 | -0.16 | -0.20 | -0.14 | -0.08 | -0.05 | -0.04 |
| 1 000 | 1000 | 0.09 | 0.00 | -0.14 | -0.24 | -0.14 | -0.07 | -0.03 | -0.02 |
| 1 060 | 1059 | 0.12 | 0.02 | -0.14 | -0.25 | -0.16 | -0.07 | -0.02 | 0.00 |
| 1 120 | 1122 | 0.15 | 0.04 | -0.14 | -0.26 | -0.19 | -0.08 | -0.01 | 0.01 |
| 1 180 | 1189 | 0.18 | 0.07 | -0.13 | -0.26 | -0.22 | -0.08 | 0.00 | 0.03 |
| 1 250 | 1259 | 0.19 | 0.09 | -0.13 | -0.27 | -0.25 | -0.09 | 0.01 | 0.05 |
| 1 320 | 1334 | 0.20 | 0.12 | -0.11 | -0.27 | -0.27 | -0.10 | 0.01 | 0.06 |
| 1 400 | 1413 | 0.20 | 0.16 | -0.08 | -0.28 | -0.29 | -0.11 | 0.02 | 0.06 |
| 1 500 | 1496 | 0.18 | 0.20 | -0.04 | -0.28 | -0.30 | -0.12 | 0.02 | 0.07 |
| 1 600 | 1585 | 0.15 | 0.24 | 0.01 | -0.28 | -0.32 | -0.14 | 0.02 | 0.07 |
| 1 700 | 1679 | 0.10 | 0.26 | 0.07 | -0.28 | -0.34 | -0.16 | 0.02 | 0.07 |
| 1 800 | 1778 | 0.04 | 0.27 | 0.12 | -0.26 | -0.37 | -0.18 | 0.02 | 0.08 |
| 1 900 | 1884 | -0.01 | 0.26 | 0.16 | -0.24 | -0.40 | -0.19 | 0.02 | 0.09 |
| 2 000 | 1995 | -0.05 | 0.23 | 0.20 | -0.20 | -0.43 | -0.21 | 0.03 | 0.11 |
| 2 120 | 2114 | -0.08 | 0.19 | 0.24 | -0.17 | -0.47 | -0.22 | 0.04 | 0.14 |
| 2 240 | 2239 | -0.09 | 0.15 | 0.28 | -0.13 | -0.49 | -0.24 | 0.05 | 0.16 |
| 2 360 | 2371 | -0.08 | 0.10 | 0.34 | -0.09 | -0.52 | -0.27 | 0.06 | 0.18 |
| 2 500 | 2512 | -0.06 | 0.04 | 0.40 | -0.02 | -0.55 | -0.31 | 0.08 | 0.19 |
| 2 650 | 2661 | -0.03 | -0.02 | 0.47 | 0.07 | -0.57 | -0.36 | 0.10 | 0.20 |
| 2 800 | 2818 | -0.09 | -0.04 | 0.47 | 0.20 | -0.61 | -0.47 | 0.10 | 0.20 |
| 3 000 | 2985 | -0.33 | 0.02 | 0.23 | 0.35 | -0.67 | -0.67 | 0.00 | 0.16 |
| 3 150 | 3162 | -0.55 | 0.07 | -0.06 | 0.42 | -0.65 | -0.85 | -0.15 | 0.08 |
| 3 350 | 3350 | -0.61 | 0.08 | -0.20 | 0.44 | -0.57 | -0.91 | -0.25 | 0.04 |
| 3 550 | 3548 | -0.57 | 0.06 | -0.22 | 0.44 | -0.47 | -0.92 | -0.29 | 0.04 |
| 3 750 | 3758 | -0.46 | 0.00 | -0.15 | 0.43 | -0.35 | -0.89 | -0.28 | 0.07 |
| 4 000 | 3981 | -0.30 | -0.09 | 0.00 | 0.40 | -0.21 | -0.85 | -0.25 | 0.11 |
| 4 250 | 4217 | -0.12 | -0.27 | 0.17 | 0.34 | -0.08 | -0.84 | -0.22 | 0.16 |
| 4 500 | 4467 | 0.03 | -0.49 | 0.32 | 0.24 | 0.02 | -0.87 | -0.21 | 0.20 |
| 4 750 | 4732 | 0.17 | -0.68 | 0.42 | 0.16 | 0.13 | -0.91 | -0.20 | 0.24 |
| 5 000 | 5012 | 0.30 | -0.72 | 0.38 | 0.12 | 0.23 | -0.98 | -0.22 | 0.27 |
| 5 300 | 5309 | 0.42 | -0.63 | 0.20 | 0.12 | 0.30 | -1.06 | -0.27 | 0.29 |
| 5 600 | 5623 | 0.46 | -0.42 | -0.09 | 0.19 | 0.39 | -1.14 | -0.32 | 0.30 |
| 6 000 | 5957 | 0.38 | -0.26 | -0.46 | 0.33 | 0.39 | -1.21 | -0.49 | 0.21 |
| 6 300 | 6310 | 0.26 | -0.02 | -0.67 | 0.44 | 0.35 | -1.14 | -0.64 | 0.14 |
| 6 700 | 6683 | 0.07 | 0.22 | -0.90 | 0.42 | 0.22 | -1.12 | -0.77 | 0.07 |
| 7 100 | 7080 | -0.22 | 0.38 | -1.06 | 0.42 | 0.18 | -1.08 | -0.83 | 0.10 |
| 7 500 | 7499 | -0.64 | 0.40 | -1.12 | 0.37 | 0.16 | -1.03 | -0.97 | 0.07 |
| 8 000 | 7943 | -0.91 | 0.41 | -1.12 | 0.22 | 0.04 | -0.96 | -1.21 | -0.04 |
| 8 500 | 8414 | -0.72 | 0.67 | -0.76 | 0.09 | 0.11 | -0.58 | -1.24 | 0.06 |
| 9 000 | 8913 | -0.31 | 0.63 | -0.35 | -0.04 | 0.16 | -0.36 | -1.23 | 0.13 |
| 9 500 | 9441 | 0.03 | 0.24 | -0.03 | -0.19 | 0.18 | -0.37 | -1.36 | 0.09 |
| 10 000 | 10000 | 0.42 | -0.20 | 0.35 | -0.15 | 0.38 | -0.25 | -1.36 | 0.26 |
| 10 600 | 10593 | 1.05 | -0.36 | 0.99 | 0.07 | 1.10 | 0.21 | -1.25 | 0.72 |
| 11 200 | 11220 | 0.82 | -0.91 | 1.33 | -0.92 | 1.16 | 0.16 | -1.75 | 0.44 |
| 11 800 | 11885 | 0.68 | 0.64 | 2.44 | -1.01 | 2.01 | 0.76 | -1.32 | 0.86 |
| 12 500 | 12589 | -1.36 | -0.82 | -0.06 | -1.87 | -0.33 | -1.02 | -2.67 | -0.94 |
| 13 200 | 13335 | -0.97 | -0.06 | 0.10 | -1.48 | -0.06 | -0.66 | -2.59 | -0.58 |
| 14 000 | 14125 | -0.66 | 0.14 | -0.69 | -1.40 | -0.51 | -0.94 | -2.85 | -0.70 |
| 15 000 | 14962 | -0.20 | 0.21 | -1.52 | -1.05 | -0.46 | -0.95 | -2.79 | -0.82 |
| 16 000 | 15849 | -0.32 | -0.34 | -2.03 | -0.80 | -0.38 | -0.91 | -3.05 | -0.83 |

## Influence of the Nova case on frequency response – plane perpendicular to the display screen (Vertical) 0° to 110°

| Nominal Frequency (Hz) | Exact Frequency (Hz) | Angle from reference direction | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0° | 10° | 20° | 30° | 40° | 50° | 60° | 70° | 80° | 90° | 100° | 110° |
| 63 | 63 | -0.19 | 0.02 | -0.09 | -0.01 | 0.01 | 0.12 | -0.13 | 0.43 | -0.24 | -0.14 | -0.28 | -0.15 |
| 80 | 82 | -0.16 | 0.01 | -0.08 | 0.00 | 0.01 | 0.09 | -0.11 | 0.33 | -0.22 | -0.12 | -0.24 | -0.14 |
| 100 | 100 | -0.13 | 0.01 | -0.06 | 0.00 | 0.01 | 0.06 | -0.08 | 0.24 | -0.19 | -0.11 | -0.20 | -0.13 |
| 125 | 126 | -0.09 | 0.01 | -0.04 | 0.00 | 0.01 | 0.03 | -0.05 | 0.13 | -0.16 | -0.09 | -0.16 | -0.12 |
| 160 | 159 | -0.06 | 0.00 | -0.02 | 0.01 | 0.01 | 0.01 | -0.02 | 0.03 | -0.13 | -0.07 | -0.11 | -0.11 |
| 200 | 200 | -0.03 | 0.00 | -0.01 | 0.01 | 0.01 | -0.01 | 0.00 | -0.05 | -0.11 | -0.06 | -0.08 | -0.10 |
| 250 | 251 | -0.01 | 0.00 | 0.00 | 0.01 | 0.01 | -0.03 | 0.02 | -0.11 | -0.08 | -0.04 | -0.05 | -0.09 |
| 315 | 316 | 0.00 | -0.01 | 0.00 | 0.01 | 0.01 | -0.04 | 0.04 | -0.13 | -0.06 | -0.04 | -0.03 | -0.09 |
| 400 | 398 | 0.00 | -0.01 | 0.00 | 0.00 | 0.00 | -0.04 | 0.05 | -0.11 | -0.03 | -0.02 | -0.02 | -0.09 |
| 500 | 501 | -0.02 | -0.03 | -0.02 | -0.01 | 0.00 | -0.03 | 0.06 | -0.07 | 0.01 | -0.01 | -0.02 | -0.09 |
| 630 | 631 | -0.06 | -0.05 | -0.04 | -0.03 | -0.02 | -0.02 | 0.05 | 0.00 | 0.05 | 0.03 | -0.01 | -0.07 |
| 800 | 794 | -0.13 | -0.10 | -0.10 | -0.08 | -0.07 | -0.04 | 0.01 | 0.06 | 0.06 | 0.08 | 0.04 | -0.02 |
| 1 000 | 1000 | -0.18 | -0.14 | -0.15 | -0.14 | -0.15 | -0.11 | -0.10 | 0.00 | -0.01 | 0.10 | 0.14 | 0.11 |
| 1 060 | 1059 | -0.16 | -0.13 | -0.14 | -0.14 | -0.16 | -0.13 | -0.13 | -0.05 | -0.03 | 0.09 | 0.16 | 0.15 |
| 1 120 | 1122 | -0.14 | -0.11 | -0.12 | -0.14 | -0.16 | -0.15 | -0.15 | -0.11 | -0.05 | 0.07 | 0.17 | 0.19 |
| 1 180 | 1189 | -0.10 | -0.08 | -0.09 | -0.12 | -0.15 | -0.16 | -0.17 | -0.17 | -0.08 | 0.05 | 0.17 | 0.22 |
| 1 250 | 1259 | -0.05 | -0.04 | -0.05 | -0.08 | -0.13 | -0.16 | -0.18 | -0.22 | -0.10 | 0.02 | 0.16 | 0.24 |
| 1 320 | 1334 | -0.01 | 0.00 | 0.00 | -0.04 | -0.10 | -0.14 | -0.18 | -0.25 | -0.13 | -0.02 | 0.14 | 0.26 |
| 1 400 | 1413 | 0.04 | 0.05 | 0.05 | 0.01 | -0.06 | -0.12 | -0.17 | -0.27 | -0.15 | -0.06 | 0.11 | 0.26 |
| 1 500 | 1496 | 0.08 | 0.09 | 0.09 | 0.06 | -0.01 | -0.07 | -0.16 | -0.26 | -0.17 | -0.11 | 0.05 | 0.26 |
| 1 600 | 1585 | 0.10 | 0.11 | 0.11 | 0.10 | 0.05 | -0.01 | -0.13 | -0.24 | -0.19 | -0.15 | -0.01 | 0.23 |
| 1 700 | 1679 | 0.10 | 0.11 | 0.12 | 0.12 | 0.10 | 0.05 | -0.07 | -0.21 | -0.21 | -0.19 | -0.08 | 0.18 |
| 1 800 | 1778 | 0.07 | 0.08 | 0.09 | 0.12 | 0.12 | 0.11 | 0.00 | -0.18 | -0.22 | -0.22 | -0.15 | 0.11 |
| 1 900 | 1884 | 0.02 | 0.03 | 0.05 | 0.09 | 0.11 | 0.13 | 0.07 | -0.13 | -0.23 | -0.24 | -0.19 | 0.03 |
| 2 000 | 1995 | -0.04 | -0.03 | 0.00 | 0.04 | 0.08 | 0.12 | 0.13 | -0.07 | -0.21 | -0.25 | -0.22 | -0.05 |
| 2 120 | 2114 | -0.09 | -0.08 | -0.06 | -0.01 | 0.03 | 0.09 | 0.16 | 0.00 | -0.16 | -0.25 | -0.22 | -0.13 |
| 2 240 | 2239 | -0.14 | -0.12 | -0.10 | -0.06 | -0.02 | 0.05 | 0.14 | 0.08 | -0.08 | -0.25 | -0.23 | -0.21 |
| 2 360 | 2371 | -0.16 | -0.14 | -0.13 | -0.10 | -0.07 | 0.01 | 0.09 | 0.13 | 0.03 | -0.23 | -0.24 | -0.27 |
| 2 500 | 2512 | -0.14 | -0.11 | -0.14 | -0.14 | -0.12 | -0.02 | 0.02 | 0.15 | 0.16 | -0.18 | -0.27 | -0.29 |
| 2 650 | 2661 | -0.07 | -0.03 | -0.10 | -0.15 | -0.18 | -0.05 | -0.05 | 0.12 | 0.25 | -0.05 | -0.37 | -0.26 |
| 2 800 | 2818 | 0.01 | 0.08 | -0.01 | -0.09 | -0.21 | -0.13 | -0.14 | 0.08 | 0.19 | 0.18 | -0.54 | -0.20 |
| 3 000 | 2985 | 0.02 | 0.09 | 0.03 | -0.01 | -0.14 | -0.19 | -0.30 | 0.00 | 0.01 | 0.25 | -0.49 | -0.27 |
| 3 150 | 3162 | -0.04 | 0.01 | 0.00 | 0.02 | -0.07 | -0.15 | -0.31 | -0.16 | -0.03 | 0.11 | -0.18 | -0.43 |
| 3 350 | 3350 | -0.05 | -0.04 | -0.02 | 0.03 | -0.01 | -0.09 | -0.18 | -0.28 | 0.01 | 0.01 | 0.09 | -0.50 |
| 3 550 | 3548 | -0.03 | -0.04 | -0.02 | 0.03 | 0.05 | -0.03 | -0.05 | -0.31 | 0.03 | 0.01 | 0.25 | -0.45 |
| 3 750 | 3758 | 0.01 | -0.01 | 0.00 | 0.04 | 0.08 | 0.06 | 0.07 | -0.27 | 0.00 | 0.08 | 0.31 | -0.32 |
| 4 000 | 3981 | 0.06 | 0.04 | 0.02 | 0.04 | 0.08 | 0.14 | 0.19 | -0.17 | -0.05 | 0.17 | 0.31 | -0.11 |
| 4 250 | 4217 | 0.09 | 0.08 | 0.04 | 0.03 | 0.03 | 0.12 | 0.29 | -0.05 | -0.09 | 0.18 | 0.28 | 0.13 |
| 4 500 | 4467 | 0.13 | 0.14 | 0.09 | 0.04 | -0.04 | 0.02 | 0.27 | 0.13 | -0.08 | 0.00 | 0.29 | 0.32 |
| 4 750 | 4732 | 0.14 | 0.17 | 0.15 | 0.15 | 0.01 | -0.03 | 0.07 | 0.34 | -0.03 | -0.23 | 0.36 | 0.40 |
| 5 000 | 5012 | 0.07 | 0.10 | 0.11 | 0.17 | 0.12 | 0.01 | -0.07 | 0.26 | 0.13 | -0.24 | 0.27 | 0.32 |
| 5 300 | 5309 | -0.01 | 0.02 | 0.02 | 0.10 | 0.10 | 0.11 | -0.12 | 0.03 | 0.33 | -0.18 | -0.08 | 0.26 |
| 5 600 | 5623 | -0.02 | 0.00 | -0.04 | 0.01 | 0.06 | 0.12 | -0.06 | -0.04 | 0.22 | -0.16 | -0.35 | 0.38 |
| 6 000 | 5957 | 0.01 | 0.02 | -0.03 | -0.05 | -0.08 | 0.08 | 0.03 | -0.19 | 0.01 | 0.14 | -0.36 | 0.38 |
| 6 300 | 6310 | 0.06 | 0.07 | 0.04 | -0.01 | -0.07 | -0.05 | 0.08 | -0.09 | -0.06 | 0.31 | -0.39 | 0.15 |
| 6 700 | 6683 | -0.05 | -0.02 | -0.02 | -0.02 | -0.13 | -0.17 | -0.05 | -0.08 | -0.30 | 0.09 | -0.40 | -0.26 |
| 7 100 | 7080 | -0.11 | -0.10 | -0.07 | -0.02 | -0.02 | -0.13 | -0.17 | -0.01 | -0.19 | -0.01 | -0.08 | -0.41 |
| 7 500 | 7499 | -0.09 | -0.09 | -0.13 | -0.13 | -0.11 | -0.06 | -0.21 | -0.11 | -0.08 | -0.19 | 0.18 | -0.41 |
| 8 000 | 7943 | -0.20 | -0.19 | -0.22 | -0.25 | -0.30 | -0.20 | -0.27 | -0.34 | -0.10 | -0.48 | 0.00 | -0.62 |
| 8 500 | 8414 | -0.10 | -0.07 | -0.02 | 0.01 | -0.14 | -0.10 | -0.03 | -0.16 | 0.06 | -0.25 | 0.08 | -0.48 |
| 9 000 | 8913 | 0.01 | -0.01 | 0.01 | 0.09 | 0.09 | -0.05 | 0.06 | 0.02 | 0.01 | 0.02 | -0.02 | 0.20 |
| 9 500 | 9441 | 0.12 | 0.07 | 0.04 | -0.01 | -0.03 | 0.02 | -0.13 | 0.02 | -0.15 | 0.16 | -0.39 | 0.30 |
| 10 000 | 10000 | 0.10 | 0.06 | 0.15 | 0.12 | -0.09 | 0.02 | -0.04 | -0.02 | -0.07 | 0.17 | -0.20 | 0.31 |
| 10 600 | 10593 | 0.59 | 0.52 | 0.56 | 0.60 | 0.48 | 0.40 | 0.54 | 0.39 | 0.55 | 0.45 | 0.27 | 0.94 |
| 11 200 | 11220 | 0.55 | 0.50 | 0.50 | 0.35 | 0.32 | 0.31 | 0.26 | 0.30 | 0.39 | 0.08 | 0.55 | 0.10 |
| 11 800 | 11885 | 1.38 | 1.43 | 1.50 | 1.47 | 1.24 | 1.36 | 1.21 | 1.59 | 1.17 | 1.21 | 1.51 | 0.94 |
| 12 500 | 12589 | -0.54 | -0.60 | -0.65 | -0.73 | -0.74 | -0.83 | -0.76 | -0.88 | -0.85 | -0.72 | -0.83 | -1.12 |
| 13 200 | 13335 | -0.07 | -0.10 | -0.05 | -0.13 | -0.31 | -0.22 | -0.30 | -0.33 | -0.23 | -0.23 | -0.41 | -0.43 |
| 14 000 | 14125 | -0.33 | -0.41 | -0.46 | -0.47 | -0.54 | -0.53 | -0.65 | -0.54 | -0.60 | -0.79 | -0.76 | -0.53 |
| 15 000 | 14962 | -0.52 | -0.57 | -0.51 | -0.59 | -0.73 | -0.69 | -0.70 | -0.71 | -0.85 | -0.93 | -0.71 | -0.51 |
| 16 000 | 15849 | -0.53 | -0.65 | -0.68 | -0.74 | -0.82 | -0.79 | -0.92 | -0.91 | -0.89 | -0.87 | -0.68 | -0.88 |

## Influence of the Nova case on frequency response – plane perpendicular to the display screen (Vertical) 120° to 230°

| Nominal Frequency (Hz) | Exact Frequency (Hz) | Angle from reference direction | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 120° | 130° | 140° | 150° | 160° | 170° | 180° | 190° | 200° | 210° | 220° | 230° |
| 63 | 63 | 0.06 | -0.07 | -0.09 | 0.33 | 0.19 | 0.05 | -0.16 | -0.04 | -0.36 | 0.18 | -0.33 | 0.10 |
| 80 | 82 | 0.03 | -0.07 | -0.09 | 0.25 | 0.14 | 0.04 | -0.13 | -0.04 | -0.30 | 0.13 | -0.27 | 0.07 |
| 100 | 100 | 0.01 | -0.08 | -0.09 | 0.17 | 0.10 | 0.02 | -0.11 | -0.04 | -0.24 | 0.09 | -0.22 | 0.04 |
| 125 | 126 | -0.02 | -0.08 | -0.09 | 0.08 | 0.04 | 0.00 | -0.08 | -0.04 | -0.17 | 0.04 | -0.16 | 0.01 |
| 160 | 159 | -0.05 | -0.08 | -0.09 | -0.01 | -0.01 | -0.01 | -0.06 | -0.04 | -0.10 | -0.01 | -0.10 | -0.03 |
| 200 | 200 | -0.07 | -0.09 | -0.09 | -0.08 | -0.05 | -0.03 | -0.04 | -0.04 | -0.04 | -0.05 | -0.06 | -0.05 |
| 250 | 251 | -0.10 | -0.09 | -0.09 | -0.14 | -0.08 | -0.04 | -0.02 | -0.04 | 0.00 | -0.08 | -0.02 | -0.07 |
| 315 | 316 | -0.11 | -0.10 | -0.09 | -0.18 | -0.10 | -0.05 | -0.02 | -0.04 | 0.02 | -0.11 | -0.01 | -0.09 |
| 400 | 398 | -0.12 | -0.11 | -0.11 | -0.19 | -0.11 | -0.05 | -0.02 | -0.04 | 0.03 | -0.12 | -0.01 | -0.10 |
| 500 | 501 | -0.13 | -0.13 | -0.12 | -0.19 | -0.11 | -0.05 | -0.02 | -0.05 | 0.01 | -0.13 | -0.04 | -0.11 |
| 630 | 631 | -0.13 | -0.16 | -0.16 | -0.17 | -0.09 | -0.05 | -0.04 | -0.06 | -0.03 | -0.13 | -0.10 | -0.12 |
| 800 | 794 | -0.11 | -0.20 | -0.21 | -0.15 | -0.06 | -0.04 | -0.05 | -0.06 | -0.09 | -0.13 | -0.17 | -0.12 |
| 1 000 | 1000 | -0.02 | -0.21 | -0.26 | -0.17 | -0.04 | -0.01 | -0.02 | -0.04 | -0.12 | -0.15 | -0.21 | -0.08 |
| 1 060 | 1059 | 0.01 | -0.20 | -0.27 | -0.18 | -0.05 | 0.00 | -0.01 | -0.03 | -0.12 | -0.17 | -0.20 | -0.06 |
| 1 120 | 1122 | 0.04 | -0.18 | -0.28 | -0.20 | -0.05 | 0.01 | 0.01 | -0.02 | -0.11 | -0.19 | -0.18 | -0.04 |
| 1 180 | 1189 | 0.08 | -0.16 | -0.28 | -0.23 | -0.06 | 0.02 | 0.03 | -0.02 | -0.11 | -0.21 | -0.17 | -0.02 |
| 1 250 | 1259 | 0.11 | -0.14 | -0.29 | -0.25 | -0.07 | 0.03 | 0.04 | -0.01 | -0.10 | -0.23 | -0.15 | 0.01 |
| 1 320 | 1334 | 0.15 | -0.11 | -0.30 | -0.28 | -0.08 | 0.03 | 0.06 | -0.01 | -0.11 | -0.25 | -0.13 | 0.05 |
| 1 400 | 1413 | 0.20 | -0.08 | -0.32 | -0.30 | -0.09 | 0.03 | 0.06 | 0.00 | -0.12 | -0.27 | -0.12 | 0.09 |
| 1 500 | 1496 | 0.26 | -0.05 | -0.33 | -0.33 | -0.10 | 0.03 | 0.07 | -0.01 | -0.15 | -0.29 | -0.11 | 0.14 |
| 1 600 | 1585 | 0.31 | 0.00 | -0.35 | -0.35 | -0.12 | 0.03 | 0.07 | -0.02 | -0.18 | -0.31 | -0.10 | 0.20 |
| 1 700 | 1679 | 0.36 | 0.06 | -0.36 | -0.39 | -0.14 | 0.03 | 0.08 | -0.03 | -0.22 | -0.33 | -0.07 | 0.27 |
| 1 800 | 1778 | 0.40 | 0.14 | -0.35 | -0.44 | -0.17 | 0.02 | 0.09 | -0.04 | -0.25 | -0.35 | -0.03 | 0.33 |
| 1 900 | 1884 | 0.42 | 0.22 | -0.33 | -0.49 | -0.21 | 0.02 | 0.11 | -0.05 | -0.26 | -0.37 | 0.05 | 0.38 |
| 2 000 | 1995 | 0.41 | 0.30 | -0.30 | -0.54 | -0.23 | 0.02 | 0.13 | -0.04 | -0.27 | -0.39 | 0.13 | 0.42 |
| 2 120 | 2114 | 0.39 | 0.38 | -0.26 | -0.58 | -0.25 | 0.04 | 0.16 | -0.04 | -0.30 | -0.40 | 0.21 | 0.46 |
| 2 240 | 2239 | 0.34 | 0.47 | -0.21 | -0.61 | -0.27 | 0.06 | 0.19 | -0.04 | -0.34 | -0.40 | 0.29 | 0.50 |
| 2 360 | 2371 | 0.27 | 0.56 | -0.15 | -0.65 | -0.28 | 0.09 | 0.21 | -0.04 | -0.40 | -0.41 | 0.37 | 0.52 |
| 2 500 | 2512 | 0.15 | 0.66 | -0.07 | -0.68 | -0.30 | 0.12 | 0.24 | -0.04 | -0.51 | -0.40 | 0.46 | 0.52 |
| 2 650 | 2661 | -0.03 | 0.75 | 0.05 | -0.72 | -0.32 | 0.14 | 0.25 | -0.05 | -0.66 | -0.37 | 0.55 | 0.47 |
| 2 800 | 2818 | -0.28 | 0.74 | 0.25 | -0.80 | -0.41 | 0.15 | 0.25 | -0.10 | -0.89 | -0.31 | 0.65 | 0.27 |
| 3 000 | 2985 | -0.44 | 0.46 | 0.50 | -0.91 | -0.69 | 0.04 | 0.20 | -0.24 | -1.08 | -0.19 | 0.68 | -0.11 |
| 3 150 | 3162 | -0.37 | 0.13 | 0.68 | -0.91 | -0.99 | -0.13 | 0.12 | -0.42 | -1.07 | -0.02 | 0.64 | -0.33 |
| 3 350 | 3350 | -0.27 | -0.07 | 0.79 | -0.80 | -1.16 | -0.25 | 0.07 | -0.52 | -0.95 | 0.15 | 0.56 | -0.35 |
| 3 550 | 3548 | -0.19 | -0.17 | 0.86 | -0.65 | -1.21 | -0.29 | 0.07 | -0.56 | -0.82 | 0.31 | 0.49 | -0.27 |
| 3 750 | 3758 | -0.13 | -0.20 | 0.92 | -0.46 | -1.20 | -0.28 | 0.11 | -0.54 | -0.70 | 0.47 | 0.42 | -0.15 |
| 4 000 | 3981 | -0.12 | -0.18 | 0.96 | -0.24 | -1.17 | -0.23 | 0.18 | -0.50 | -0.63 | 0.64 | 0.32 | 0.00 |
| 4 250 | 4217 | -0.19 | -0.15 | 0.95 | -0.03 | -1.16 | -0.18 | 0.24 | -0.47 | -0.59 | 0.79 | 0.20 | 0.14 |
| 4 500 | 4467 | -0.34 | -0.10 | 0.88 | 0.19 | -1.20 | -0.14 | 0.29 | -0.47 | -0.59 | 0.93 | 0.06 | 0.24 |
| 4 750 | 4732 | -0.48 | -0.01 | 0.74 | 0.44 | -1.26 | -0.11 | 0.35 | -0.48 | -0.60 | 1.07 | -0.08 | 0.25 |
| 5 000 | 5012 | -0.48 | 0.08 | 0.49 | 0.68 | -1.40 | -0.13 | 0.38 | -0.58 | -0.59 | 1.12 | -0.17 | 0.05 |
| 5 300 | 5309 | -0.20 | 0.04 | 0.18 | 0.90 | -1.56 | -0.17 | 0.39 | -0.71 | -0.53 | 1.09 | -0.12 | -0.34 |
| 5 600 | 5623 | 0.19 | -0.17 | -0.17 | 1.15 | -1.73 | -0.23 | 0.39 | -0.90 | -0.45 | 0.99 | 0.06 | -0.88 |
| 6 000 | 5957 | 0.36 | -0.54 | -0.45 | 1.32 | -1.92 | -0.39 | 0.31 | -1.19 | -0.20 | 0.65 | 0.29 | -1.15 |
| 6 300 | 6310 | 0.34 | -0.88 | -0.45 | 1.44 | -1.91 | -0.57 | 0.25 | -1.34 | 0.10 | 0.29 | 0.38 | -0.82 |
| 6 700 | 6683 | 0.15 | -1.10 | -0.30 | 1.40 | -1.80 | -0.75 | 0.20 | -1.46 | 0.23 | -0.07 | 0.22 | -0.41 |
| 7 100 | 7080 | 0.15 | -0.78 | -0.03 | 1.27 | -1.61 | -0.84 | 0.24 | -1.62 | 0.43 | -0.37 | -0.04 | -0.08 |
| 7 500 | 7499 | 0.39 | -0.31 | 0.09 | 1.14 | -1.48 | -0.94 | 0.22 | -1.88 | 0.70 | -0.55 | -0.54 | 0.11 |
| 8 000 | 7943 | 0.48 | -0.03 | 0.05 | 0.97 | -1.37 | -1.14 | 0.13 | -2.05 | 0.80 | -0.51 | -0.98 | 0.18 |
| 8 500 | 8414 | 0.39 | 0.26 | 0.01 | 0.78 | -0.78 | -1.25 | 0.22 | -2.12 | 1.06 | -0.27 | -1.34 | 0.52 |
| 9 000 | 8913 | 0.03 | 0.19 | -0.46 | 0.37 | -0.24 | -1.34 | 0.33 | -2.23 | 1.40 | 0.22 | -1.06 | 1.10 |
| 9 500 | 9441 | -0.13 | 0.11 | -1.12 | -0.11 | 0.03 | -1.56 | 0.30 | -2.34 | 1.29 | 0.54 | -0.59 | 1.25 |
| 10 000 | 10000 | -0.11 | 0.55 | -1.47 | -0.41 | 0.47 | -1.72 | 0.44 | -2.42 | 1.25 | 0.83 | -0.24 | 1.14 |
| 10 600 | 10593 | -0.19 | 1.62 | -0.95 | -0.22 | 1.50 | -1.64 | 0.93 | -2.33 | 1.64 | 1.71 | 0.22 | 1.13 |
| 11 200 | 11220 | -0.30 | 0.92 | 0.34 | 0.38 | 2.20 | -2.47 | 0.71 | -2.93 | 1.20 | 1.42 | 0.12 | -0.30 |
| 11 800 | 11885 | 1.62 | 1.02 | 1.55 | 2.51 | 3.70 | -2.24 | 1.27 | -2.22 | 1.19 | 1.42 | 2.02 | 0.20 |
| 12 500 | 12589 | -0.50 | -0.50 | -1.14 | -0.11 | 1.12 | -4.02 | -0.60 | -2.73 | -0.68 | -1.31 | 0.99 | -1.70 |
| 13 200 | 13335 | 0.18 | -0.43 | -0.59 | 0.11 | 1.70 | -4.07 | -0.17 | -2.56 | -0.30 | -1.13 | 1.64 | -0.88 |
| 14 000 | 14125 | -0.15 | -1.28 | -0.44 | -0.68 | 1.39 | -4.68 | -0.26 | -2.84 | -0.49 | -1.63 | 1.28 | -0.37 |
| 15 000 | 14962 | -0.50 | -1.66 | -0.04 | -1.46 | 1.08 | -5.31 | -0.38 | -2.95 | -0.70 | -1.72 | 0.55 | 0.30 |
| 16 000 | 15849 | -0.94 | -1.45 | -0.17 | -1.93 | 0.81 | -5.99 | -0.43 | -2.95 | -0.25 | -1.86 | -0.12 | 0.66 |

## Influence of the Nova case on frequency response – plane perpendicular to the display screen (Vertical) 240° to 350°

| Nominal Frequency (Hz) | Exact Frequency (Hz) | Angle from reference direction | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 240° | 250° | 260° | 270° | 280° | 290° | 300° | 310° | 320° | 330° | 340° | 350° |
| 63 | 63 | -0.24 | 0.30 | 0.01 | -0.19 | 0.01 | 0.03 | 0.20 | 0.11 | -0.03 | 0.40 | -0.29 | 0.01 |
| 80 | 82 | -0.20 | 0.23 | 0.00 | -0.15 | 0.01 | 0.03 | 0.17 | 0.10 | -0.02 | 0.32 | -0.23 | 0.02 |
| 100 | 100 | -0.17 | 0.17 | 0.00 | -0.12 | 0.00 | 0.04 | 0.14 | 0.09 | 0.00 | 0.25 | -0.17 | 0.02 |
| 125 | 126 | -0.13 | 0.09 | 0.00 | -0.09 | 0.00 | 0.04 | 0.11 | 0.08 | 0.02 | 0.17 | -0.09 | 0.02 |
| 160 | 159 | -0.09 | 0.02 | 0.00 | -0.05 | 0.00 | 0.04 | 0.07 | 0.07 | 0.03 | 0.09 | -0.03 | 0.02 |
| 200 | 200 | -0.06 | -0.03 | 0.00 | -0.02 | 0.01 | 0.05 | 0.05 | 0.06 | 0.05 | 0.02 | 0.03 | 0.03 |
| 250 | 251 | -0.03 | -0.08 | 0.00 | 0.01 | 0.01 | 0.05 | 0.03 | 0.05 | 0.06 | -0.02 | 0.07 | 0.03 |
| 315 | 316 | -0.02 | -0.10 | 0.00 | 0.03 | 0.03 | 0.06 | 0.02 | 0.05 | 0.07 | -0.05 | 0.10 | 0.03 |
| 400 | 398 | -0.01 | -0.10 | 0.01 | 0.05 | 0.04 | 0.06 | 0.03 | 0.05 | 0.07 | -0.06 | 0.10 | 0.03 |
| 500 | 501 | -0.01 | -0.08 | 0.03 | 0.07 | 0.07 | 0.07 | 0.04 | 0.06 | 0.06 | -0.05 | 0.09 | 0.02 |
| 630 | 631 | -0.02 | -0.02 | 0.07 | 0.10 | 0.11 | 0.08 | 0.06 | 0.06 | 0.04 | -0.03 | 0.04 | 0.00 |
| 800 | 794 | -0.02 | 0.09 | 0.16 | 0.13 | 0.12 | 0.08 | 0.05 | 0.03 | -0.02 | -0.03 | -0.05 | -0.04 |
| 1 000 | 1000 | 0.08 | 0.23 | 0.22 | 0.11 | 0.05 | 0.00 | -0.03 | -0.04 | -0.09 | -0.06 | -0.10 | -0.08 |
| 1 060 | 1059 | 0.13 | 0.24 | 0.22 | 0.09 | 0.02 | -0.03 | -0.05 | -0.05 | -0.10 | -0.06 | -0.08 | -0.07 |
| 1 120 | 1122 | 0.17 | 0.25 | 0.20 | 0.06 | -0.01 | -0.05 | -0.07 | -0.06 | -0.09 | -0.06 | -0.05 | -0.05 |
| 1 180 | 1189 | 0.22 | 0.24 | 0.17 | 0.03 | -0.04 | -0.07 | -0.09 | -0.07 | -0.08 | -0.06 | -0.01 | -0.02 |
| 1 250 | 1259 | 0.26 | 0.23 | 0.14 | 0.01 | -0.06 | -0.09 | -0.11 | -0.06 | -0.06 | -0.04 | 0.04 | 0.02 |
| 1 320 | 1334 | 0.30 | 0.21 | 0.10 | -0.02 | -0.08 | -0.10 | -0.11 | -0.05 | -0.03 | 0.00 | 0.09 | 0.06 |
| 1 400 | 1413 | 0.33 | 0.19 | 0.05 | -0.05 | -0.10 | -0.11 | -0.11 | -0.02 | 0.01 | 0.04 | 0.14 | 0.11 |
| 1 500 | 1496 | 0.36 | 0.16 | 0.01 | -0.08 | -0.12 | -0.13 | -0.09 | 0.01 | 0.07 | 0.10 | 0.18 | 0.14 |
| 1 600 | 1585 | 0.37 | 0.12 | -0.04 | -0.11 | -0.14 | -0.14 | -0.05 | 0.07 | 0.12 | 0.15 | 0.21 | 0.16 |
| 1 700 | 1679 | 0.37 | 0.06 | -0.09 | -0.14 | -0.17 | -0.14 | 0.00 | 0.14 | 0.17 | 0.19 | 0.21 | 0.15 |
| 1 800 | 1778 | 0.35 | -0.01 | -0.12 | -0.16 | -0.19 | -0.11 | 0.08 | 0.20 | 0.20 | 0.18 | 0.19 | 0.12 |
| 1 900 | 1884 | 0.31 | -0.09 | -0.13 | -0.19 | -0.20 | -0.03 | 0.16 | 0.24 | 0.20 | 0.12 | 0.15 | 0.06 |
| 2 000 | 1995 | 0.26 | -0.15 | -0.14 | -0.21 | -0.17 | 0.08 | 0.22 | 0.25 | 0.16 | 0.05 | 0.09 | 0.00 |
| 2 120 | 2114 | 0.19 | -0.18 | -0.14 | -0.24 | -0.10 | 0.19 | 0.26 | 0.23 | 0.10 | -0.02 | 0.04 | -0.06 |
| 2 240 | 2239 | 0.10 | -0.17 | -0.16 | -0.26 | 0.02 | 0.29 | 0.26 | 0.17 | 0.02 | -0.08 | -0.02 | -0.09 |
| 2 360 | 2371 | 0.00 | -0.14 | -0.21 | -0.25 | 0.18 | 0.36 | 0.22 | 0.09 | -0.06 | -0.12 | -0.07 | -0.10 |
| 2 500 | 2512 | -0.12 | -0.09 | -0.31 | -0.17 | 0.35 | 0.36 | 0.14 | -0.01 | -0.17 | -0.11 | -0.09 | -0.07 |
| 2 650 | 2661 | -0.24 | -0.04 | -0.46 | 0.03 | 0.49 | 0.28 | 0.00 | -0.15 | -0.24 | -0.01 | -0.06 | 0.01 |
| 2 800 | 2818 | -0.30 | -0.12 | -0.54 | 0.33 | 0.44 | 0.07 | -0.23 | -0.23 | -0.20 | 0.17 | -0.01 | 0.09 |
| 3 000 | 2985 | -0.23 | -0.47 | -0.26 | 0.42 | 0.13 | -0.26 | -0.36 | -0.14 | -0.06 | 0.17 | 0.01 | 0.04 |
| 3 150 | 3162 | -0.14 | -0.69 | 0.09 | 0.28 | -0.12 | -0.44 | -0.25 | -0.03 | 0.01 | 0.00 | 0.00 | -0.08 |
| 3 350 | 3350 | -0.13 | -0.65 | 0.27 | 0.17 | -0.25 | -0.41 | -0.11 | 0.01 | 0.04 | -0.14 | 0.01 | -0.13 |
| 3 550 | 3548 | -0.16 | -0.46 | 0.35 | 0.13 | -0.31 | -0.27 | 0.00 | 0.06 | 0.04 | -0.21 | 0.05 | -0.12 |
| 3 750 | 3758 | -0.24 | -0.19 | 0.38 | 0.11 | -0.31 | -0.09 | 0.10 | 0.09 | 0.03 | -0.21 | 0.12 | -0.07 |
| 4 000 | 3981 | -0.36 | 0.12 | 0.40 | 0.03 | -0.21 | 0.09 | 0.18 | 0.07 | 0.03 | -0.12 | 0.18 | -0.01 |
| 4 250 | 4217 | -0.49 | 0.39 | 0.43 | -0.13 | 0.00 | 0.24 | 0.18 | 0.04 | 0.11 | 0.00 | 0.22 | 0.06 |
| 4 500 | 4467 | -0.55 | 0.56 | 0.43 | -0.29 | 0.23 | 0.36 | 0.07 | 0.15 | 0.22 | 0.10 | 0.27 | 0.17 |
| 4 750 | 4732 | -0.39 | 0.63 | 0.26 | -0.16 | 0.39 | 0.28 | 0.05 | 0.33 | 0.21 | 0.20 | 0.35 | 0.26 |
| 5 000 | 5012 | -0.01 | 0.63 | -0.22 | 0.15 | 0.48 | -0.08 | 0.24 | 0.24 | 0.23 | 0.27 | 0.32 | 0.17 |
| 5 300 | 5309 | 0.38 | 0.61 | -0.57 | 0.28 | 0.31 | -0.09 | 0.18 | 0.21 | 0.28 | 0.17 | 0.19 | 0.06 |
| 5 600 | 5623 | 0.54 | 0.37 | -0.37 | 0.41 | -0.23 | 0.14 | 0.04 | 0.24 | 0.13 | 0.05 | 0.10 | -0.01 |
| 6 000 | 5957 | 0.47 | -0.35 | -0.09 | 0.48 | -0.20 | -0.08 | 0.10 | 0.07 | -0.02 | -0.05 | 0.05 | -0.05 |
| 6 300 | 6310 | 0.51 | -0.81 | -0.02 | 0.02 | 0.10 | -0.10 | 0.08 | -0.01 | -0.01 | -0.04 | 0.10 | -0.02 |
| 6 700 | 6683 | 0.65 | -0.72 | 0.27 | -0.46 | -0.06 | -0.02 | -0.05 | -0.05 | 0.02 | -0.04 | 0.07 | -0.04 |
| 7 100 | 7080 | 0.70 | -0.49 | 0.53 | -0.17 | -0.15 | 0.00 | -0.12 | -0.03 | -0.01 | -0.07 | 0.04 | -0.14 |
| 7 500 | 7499 | 0.26 | -0.32 | 0.08 | 0.07 | -0.02 | -0.12 | -0.10 | 0.04 | 0.03 | -0.12 | -0.04 | -0.10 |
| 8 000 | 7943 | -0.45 | 0.02 | -0.54 | -0.11 | 0.05 | -0.20 | 0.04 | 0.05 | -0.06 | -0.13 | 0.14 | -0.01 |
| 8 500 | 8414 | -0.95 | 0.80 | -0.26 | -0.11 | -0.05 | -0.10 | 0.06 | 0.09 | 0.07 | 0.13 | 0.13 | -0.04 |
| 9 000 | 8913 | -0.65 | 0.72 | 0.28 | 0.36 | 0.06 | 0.25 | 0.32 | 0.23 | 0.33 | 0.15 | 0.26 | 0.08 |
| 9 500 | 9441 | -0.64 | -0.27 | 0.03 | 0.14 | -0.03 | -0.09 | -0.06 | 0.19 | 0.09 | -0.03 | 0.25 | 0.06 |
| 10 000 | 10000 | -0.38 | -0.58 | -0.14 | 0.03 | 0.23 | 0.08 | 0.14 | 0.01 | 0.07 | -0.06 | 0.23 | -0.08 |
| 10 600 | 10593 | 0.83 | 0.38 | 0.65 | 0.24 | 0.24 | 0.17 | 0.54 | 0.45 | 0.47 | 0.36 | 0.42 | 0.23 |
| 11 200 | 11220 | 1.69 | 0.52 | 0.45 | 0.40 | 0.66 | 0.38 | 0.31 | 0.28 | 0.34 | 0.17 | 0.35 | 0.15 |
| 11 800 | 11885 | 2.06 | 0.82 | 1.33 | 1.45 | 0.98 | 1.41 | 1.60 | 1.59 | 1.46 | 1.34 | 1.20 | 1.12 |
| 12 500 | 12589 | -0.86 | -0.38 | -0.76 | -0.36 | -0.40 | -0.57 | -0.40 | -0.43 | -0.34 | -0.53 | -0.33 | -0.46 |
| 13 200 | 13335 | -0.47 | 0.09 | -0.14 | 0.01 | 0.01 | -0.12 | -0.12 | -0.11 | -0.07 | -0.14 | -0.05 | -0.25 |
| 14 000 | 14125 | -0.25 | -0.31 | -0.13 | -0.44 | -0.38 | -0.27 | -0.18 | -0.24 | -0.13 | -0.39 | -0.16 | -0.35 |
| 15 000 | 14962 | -0.80 | -0.82 | -0.87 | -0.42 | -0.41 | -0.67 | -0.39 | -0.49 | -0.41 | -0.52 | -0.36 | -0.60 |
| 16 000 | 15849 | -0.76 | -1.17 | -0.49 | -0.44 | -0.54 | -0.66 | -0.53 | -0.63 | -0.46 | -0.67 | -0.44 | -0.64 |

# Influence of the WS90 windshield on frequency response
# 0° to 110°

| Nominal Frequency (Hz) | Exact Frequency (Hz) | Angle from reference direction | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0° | 10° | 20° | 30° | 40° | 50° | 60° | 70° | 80° | 90° | 100° | 110° |
| 63 | 63 | -0.10 | 0.22 | -0.24 | -0.05 | 0.09 | -0.25 | 0.06 | -0.34 | -0.06 | -0.01 | 0.11 | -0.04 |
| 80 | 79 | -0.07 | 0.19 | -0.19 | -0.03 | 0.08 | -0.20 | 0.05 | -0.27 | -0.05 | -0.01 | 0.09 | -0.04 |
| 100 | 100 | -0.03 | 0.16 | -0.12 | -0.01 | 0.07 | -0.15 | 0.04 | -0.19 | -0.03 | 0.00 | 0.07 | -0.03 |
| 125 | 126 | 0.01 | 0.12 | -0.05 | 0.02 | 0.06 | -0.08 | 0.03 | -0.10 | -0.02 | 0.01 | 0.04 | -0.02 |
| 160 | 159 | 0.05 | 0.09 | 0.01 | 0.04 | 0.05 | -0.03 | 0.02 | -0.02 | 0.00 | 0.02 | 0.02 | -0.02 |
| 200 | 200 | 0.08 | 0.07 | 0.06 | 0.06 | 0.05 | 0.02 | 0.01 | 0.05 | 0.02 | 0.03 | 0.00 | -0.01 |
| 250 | 251 | 0.11 | 0.06 | 0.11 | 0.08 | 0.05 | 0.06 | 0.01 | 0.10 | 0.03 | 0.04 | -0.01 | 0.00 |
| 315 | 316 | 0.13 | 0.05 | 0.13 | 0.10 | 0.05 | 0.09 | 0.02 | 0.13 | 0.04 | 0.04 | -0.01 | 0.01 |
| 400 | 398 | 0.15 | 0.06 | 0.15 | 0.12 | 0.06 | 0.11 | 0.03 | 0.14 | 0.06 | 0.05 | -0.01 | 0.03 |
| 500 | 501 | 0.16 | 0.09 | 0.16 | 0.13 | 0.08 | 0.12 | 0.05 | 0.14 | 0.07 | 0.06 | 0.01 | 0.04 |
| 630 | 631 | 0.18 | 0.13 | 0.16 | 0.15 | 0.11 | 0.13 | 0.09 | 0.12 | 0.09 | 0.08 | 0.04 | 0.06 |
| 800 | 794 | 0.21 | 0.21 | 0.17 | 0.19 | 0.16 | 0.15 | 0.13 | 0.11 | 0.12 | 0.11 | 0.09 | 0.10 |
| 1 000 | 1000 | 0.27 | 0.29 | 0.22 | 0.25 | 0.23 | 0.21 | 0.20 | 0.15 | 0.17 | 0.17 | 0.16 | 0.15 |
| 1 060 | 1059 | 0.29 | 0.30 | 0.25 | 0.27 | 0.25 | 0.24 | 0.21 | 0.18 | 0.19 | 0.18 | 0.18 | 0.16 |
| 1 120 | 1122 | 0.31 | 0.32 | 0.28 | 0.29 | 0.27 | 0.26 | 0.23 | 0.21 | 0.21 | 0.20 | 0.20 | 0.17 |
| 1 180 | 1189 | 0.34 | 0.33 | 0.31 | 0.30 | 0.28 | 0.29 | 0.24 | 0.25 | 0.22 | 0.22 | 0.21 | 0.18 |
| 1 250 | 1259 | 0.36 | 0.35 | 0.34 | 0.32 | 0.30 | 0.31 | 0.26 | 0.28 | 0.24 | 0.24 | 0.23 | 0.19 |
| 1 320 | 1334 | 0.38 | 0.36 | 0.36 | 0.34 | 0.32 | 0.34 | 0.28 | 0.31 | 0.26 | 0.26 | 0.25 | 0.20 |
| 1 400 | 1413 | 0.41 | 0.39 | 0.39 | 0.36 | 0.34 | 0.37 | 0.30 | 0.34 | 0.28 | 0.28 | 0.27 | 0.22 |
| 1 500 | 1496 | 0.43 | 0.43 | 0.41 | 0.39 | 0.37 | 0.39 | 0.33 | 0.36 | 0.32 | 0.31 | 0.30 | 0.25 |
| 1 600 | 1585 | 0.46 | 0.47 | 0.44 | 0.42 | 0.41 | 0.41 | 0.37 | 0.38 | 0.35 | 0.34 | 0.33 | 0.28 |
| 1 700 | 1679 | 0.49 | 0.50 | 0.46 | 0.45 | 0.44 | 0.44 | 0.41 | 0.41 | 0.39 | 0.37 | 0.37 | 0.31 |
| 1 800 | 1778 | 0.52 | 0.53 | 0.49 | 0.48 | 0.47 | 0.47 | 0.44 | 0.45 | 0.43 | 0.41 | 0.40 | 0.35 |
| 1 900 | 1884 | 0.54 | 0.54 | 0.52 | 0.51 | 0.50 | 0.51 | 0.46 | 0.50 | 0.46 | 0.44 | 0.42 | 0.38 |
| 2 000 | 1995 | 0.55 | 0.53 | 0.54 | 0.52 | 0.51 | 0.53 | 0.48 | 0.54 | 0.49 | 0.47 | 0.44 | 0.42 |
| 2 120 | 2114 | 0.55 | 0.53 | 0.55 | 0.53 | 0.53 | 0.55 | 0.49 | 0.58 | 0.53 | 0.50 | 0.46 | 0.45 |
| 2 240 | 2239 | 0.54 | 0.53 | 0.55 | 0.54 | 0.54 | 0.57 | 0.52 | 0.60 | 0.56 | 0.54 | 0.50 | 0.49 |
| 2 360 | 2371 | 0.52 | 0.54 | 0.53 | 0.53 | 0.54 | 0.58 | 0.54 | 0.61 | 0.59 | 0.57 | 0.55 | 0.53 |
| 2 500 | 2512 | 0.49 | 0.55 | 0.50 | 0.51 | 0.55 | 0.58 | 0.57 | 0.61 | 0.61 | 0.61 | 0.63 | 0.56 |
| 2 650 | 2661 | 0.44 | 0.55 | 0.43 | 0.46 | 0.55 | 0.57 | 0.60 | 0.59 | 0.62 | 0.65 | 0.72 | 0.59 |
| 2 800 | 2818 | 0.36 | 0.52 | 0.32 | 0.39 | 0.51 | 0.52 | 0.59 | 0.55 | 0.61 | 0.67 | 0.81 | 0.61 |
| 3 000 | 2985 | 0.28 | 0.41 | 0.23 | 0.30 | 0.40 | 0.42 | 0.48 | 0.50 | 0.56 | 0.62 | 0.75 | 0.61 |
| 3 150 | 3162 | 0.24 | 0.27 | 0.20 | 0.24 | 0.27 | 0.33 | 0.34 | 0.44 | 0.50 | 0.52 | 0.60 | 0.58 |
| 3 350 | 3350 | 0.21 | 0.17 | 0.19 | 0.19 | 0.16 | 0.28 | 0.23 | 0.38 | 0.42 | 0.42 | 0.47 | 0.55 |
| 3 550 | 3548 | 0.18 | 0.11 | 0.18 | 0.15 | 0.09 | 0.24 | 0.15 | 0.31 | 0.34 | 0.34 | 0.38 | 0.49 |
| 3 750 | 3758 | 0.16 | 0.08 | 0.16 | 0.11 | 0.03 | 0.20 | 0.07 | 0.23 | 0.25 | 0.25 | 0.30 | 0.42 |
| 4 000 | 3981 | 0.14 | 0.07 | 0.14 | 0.08 | 0.00 | 0.14 | 0.00 | 0.13 | 0.14 | 0.15 | 0.21 | 0.32 |
| 4 250 | 4217 | 0.14 | 0.09 | 0.12 | 0.06 | -0.01 | 0.08 | -0.06 | 0.01 | 0.01 | 0.03 | 0.10 | 0.18 |
| 4 500 | 4467 | 0.16 | 0.14 | 0.12 | 0.09 | 0.02 | 0.03 | -0.10 | -0.10 | -0.11 | -0.10 | -0.04 | 0.02 |
| 4 750 | 4732 | 0.18 | 0.21 | 0.14 | 0.13 | 0.07 | 0.01 | -0.10 | -0.17 | -0.21 | -0.23 | -0.19 | -0.18 |
| 5 000 | 5012 | 0.21 | 0.25 | 0.17 | 0.19 | 0.13 | 0.05 | -0.06 | -0.18 | -0.25 | -0.32 | -0.34 | -0.38 |
| 5 300 | 5309 | 0.20 | 0.25 | 0.17 | 0.21 | 0.17 | 0.11 | 0.00 | -0.12 | -0.23 | -0.35 | -0.44 | -0.55 |
| 5 600 | 5623 | 0.16 | 0.22 | 0.12 | 0.20 | 0.19 | 0.14 | 0.08 | -0.06 | -0.15 | -0.32 | -0.48 | -0.65 |
| 6 000 | 5957 | 0.11 | 0.14 | 0.06 | 0.13 | 0.14 | 0.16 | 0.11 | 0.03 | -0.05 | -0.22 | -0.43 | -0.67 |
| 6 300 | 6310 | 0.07 | 0.08 | 0.03 | 0.05 | 0.06 | 0.12 | 0.08 | 0.07 | 0.02 | -0.09 | -0.33 | -0.61 |
| 6 700 | 6683 | 0.06 | 0.08 | 0.01 | 0.02 | -0.02 | 0.02 | 0.00 | 0.04 | 0.05 | 0.01 | -0.19 | -0.47 |
| 7 100 | 7080 | 0.10 | 0.11 | 0.05 | 0.03 | -0.03 | -0.04 | -0.09 | -0.02 | 0.02 | 0.02 | -0.08 | -0.33 |
| 7 500 | 7499 | 0.12 | 0.14 | 0.07 | 0.06 | -0.01 | -0.08 | -0.18 | -0.16 | -0.11 | -0.05 | -0.05 | -0.21 |
| 8 000 | 7943 | 0.15 | 0.18 | 0.09 | 0.09 | 0.01 | -0.10 | -0.25 | -0.29 | -0.31 | -0.22 | -0.15 | -0.21 |
| 8 500 | 8414 | 0.15 | 0.24 | 0.07 | 0.14 | 0.05 | -0.05 | -0.19 | -0.41 | -0.49 | -0.51 | -0.37 | -0.34 |
| 9 000 | 8913 | -0.07 | 0.02 | -0.06 | 0.01 | -0.01 | -0.08 | -0.19 | -0.36 | -0.58 | -0.74 | -0.76 | -0.74 |
| 9 500 | 9441 | -0.20 | -0.14 | -0.22 | -0.18 | -0.20 | -0.25 | -0.31 | -0.33 | -0.59 | -0.85 | -1.07 | -1.19 |
| 10 000 | 10000 | -0.15 | -0.13 | -0.22 | -0.26 | -0.35 | -0.42 | -0.48 | -0.33 | -0.57 | -0.80 | -1.15 | -1.47 |
| 10 600 | 10593 | -0.20 | -0.14 | -0.25 | -0.34 | -0.41 | -0.59 | -0.60 | -0.54 | -0.63 | -0.68 | -1.01 | -1.47 |
| 11 200 | 11220 | -0.20 | -0.12 | -0.25 | -0.36 | -0.32 | -0.59 | -0.67 | -0.75 | -0.83 | -0.73 | -0.85 | -1.20 |
| 11 800 | 11885 | -0.38 | -0.20 | -0.33 | -0.54 | -0.27 | -0.56 | -0.57 | -1.06 | -1.06 | -0.90 | -0.81 | -0.88 |
| 12 500 | 12589 | -0.27 | -0.24 | -0.24 | -0.31 | -0.35 | -0.42 | -0.62 | -0.72 | -1.08 | -1.18 | -1.25 | -1.18 |
| 13 200 | 13335 | -0.25 | -0.19 | -0.27 | -0.40 | -0.46 | -0.60 | -0.75 | -0.79 | -1.08 | -1.26 | -1.59 | -1.65 |
| 14 000 | 14125 | -0.41 | -0.30 | -0.32 | -0.39 | -0.50 | -0.72 | -0.98 | -0.89 | -1.11 | -1.20 | -1.72 | -2.10 |
| 15 000 | 14962 | -0.43 | -0.28 | -0.37 | -0.43 | -0.47 | -0.72 | -1.04 | -1.07 | -1.27 | -1.27 | -1.66 | -2.25 |
| 16 000 | 15849 | -0.39 | -0.27 | -0.35 | -0.42 | -0.56 | -0.74 | -1.05 | -1.06 | -1.45 | -1.47 | -1.64 | -1.98 |

## Influence of the WS90 windshield on frequency response 120° to 180°

Note: the WS90 is spherically symmetrical, angles 350°-190° are respectively equivalent to angles 10°-170°.

| Nominal Frequency (Hz) | Exact Frequency (Hz) | Angle from reference direction | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 120° | 130° | 140° | 150° | 160° | 170° | 180° |
| 63 | 63 | 0.05 | -0.22 | -0.20 | -0.21 | -0.21 | -0.22 | 0.33 |
| 80 | 79 | 0.04 | -0.19 | -0.17 | -0.18 | -0.18 | -0.18 | 0.27 |
| 100 | 100 | 0.03 | -0.15 | -0.13 | -0.14 | -0.14 | -0.14 | 0.19 |
| 125 | 126 | 0.01 | -0.11 | -0.09 | -0.10 | -0.10 | -0.10 | 0.11 |
| 160 | 159 | 0.00 | -0.07 | -0.05 | -0.06 | -0.06 | -0.06 | 0.03 |
| 200 | 200 | -0.02 | -0.04 | -0.02 | -0.02 | -0.03 | -0.03 | -0.03 |
| 250 | 251 | -0.03 | -0.01 | 0.01 | 0.00 | -0.01 | 0.00 | -0.07 |
| 315 | 316 | -0.03 | 0.01 | 0.03 | 0.02 | 0.01 | 0.01 | -0.10 |
| 400 | 398 | -0.03 | 0.03 | 0.04 | 0.04 | 0.02 | 0.02 | -0.10 |
| 500 | 501 | -0.01 | 0.04 | 0.05 | 0.04 | 0.02 | 0.02 | -0.08 |
| 630 | 631 | 0.02 | 0.05 | 0.05 | 0.04 | 0.02 | 0.02 | -0.03 |
| 800 | 794 | 0.07 | 0.06 | 0.06 | 0.04 | 0.02 | 0.02 | 0.04 |
| 1 000 | 1000 | 0.13 | 0.09 | 0.09 | 0.08 | 0.05 | 0.04 | 0.10 |
| 1 060 | 1059 | 0.14 | 0.10 | 0.11 | 0.09 | 0.06 | 0.06 | 0.10 |
| 1 120 | 1122 | 0.15 | 0.12 | 0.12 | 0.10 | 0.08 | 0.08 | 0.10 |
| 1 180 | 1189 | 0.16 | 0.14 | 0.14 | 0.12 | 0.09 | 0.09 | 0.10 |
| 1 250 | 1259 | 0.18 | 0.15 | 0.16 | 0.13 | 0.11 | 0.11 | 0.10 |
| 1 320 | 1334 | 0.19 | 0.17 | 0.17 | 0.15 | 0.13 | 0.13 | 0.11 |
| 1 400 | 1413 | 0.21 | 0.19 | 0.19 | 0.16 | 0.14 | 0.15 | 0.12 |
| 1 500 | 1496 | 0.24 | 0.21 | 0.21 | 0.18 | 0.16 | 0.16 | 0.15 |
| 1 600 | 1585 | 0.27 | 0.24 | 0.23 | 0.20 | 0.18 | 0.18 | 0.18 |
| 1 700 | 1679 | 0.30 | 0.27 | 0.25 | 0.22 | 0.20 | 0.20 | 0.21 |
| 1 800 | 1778 | 0.34 | 0.31 | 0.29 | 0.26 | 0.23 | 0.23 | 0.24 |
| 1 900 | 1884 | 0.37 | 0.35 | 0.32 | 0.30 | 0.26 | 0.26 | 0.25 |
| 2 000 | 1995 | 0.40 | 0.39 | 0.36 | 0.34 | 0.29 | 0.30 | 0.27 |
| 2 120 | 2114 | 0.43 | 0.42 | 0.39 | 0.38 | 0.33 | 0.34 | 0.29 |
| 2 240 | 2239 | 0.47 | 0.46 | 0.42 | 0.41 | 0.36 | 0.37 | 0.33 |
| 2 360 | 2371 | 0.52 | 0.49 | 0.46 | 0.43 | 0.39 | 0.40 | 0.39 |
| 2 500 | 2512 | 0.58 | 0.52 | 0.49 | 0.45 | 0.42 | 0.43 | 0.47 |
| 2 650 | 2661 | 0.69 | 0.54 | 0.52 | 0.46 | 0.45 | 0.45 | 0.59 |
| 2 800 | 2818 | 0.81 | 0.57 | 0.57 | 0.49 | 0.49 | 0.49 | 0.72 |
| 3 000 | 2985 | 0.79 | 0.61 | 0.60 | 0.53 | 0.52 | 0.53 | 0.70 |
| 3 150 | 3162 | 0.64 | 0.62 | 0.59 | 0.56 | 0.53 | 0.55 | 0.55 |
| 3 350 | 3350 | 0.49 | 0.61 | 0.56 | 0.55 | 0.52 | 0.55 | 0.42 |
| 3 550 | 3548 | 0.38 | 0.57 | 0.53 | 0.53 | 0.50 | 0.54 | 0.35 |
| 3 750 | 3758 | 0.31 | 0.52 | 0.49 | 0.50 | 0.48 | 0.52 | 0.31 |
| 4 000 | 3981 | 0.25 | 0.45 | 0.44 | 0.46 | 0.45 | 0.48 | 0.29 |
| 4 250 | 4217 | 0.18 | 0.35 | 0.36 | 0.39 | 0.39 | 0.43 | 0.26 |
| 4 500 | 4467 | 0.08 | 0.21 | 0.25 | 0.30 | 0.29 | 0.34 | 0.23 |
| 4 750 | 4732 | -0.08 | 0.03 | 0.09 | 0.16 | 0.16 | 0.20 | 0.15 |
| 5 000 | 5012 | -0.29 | -0.19 | -0.12 | -0.02 | -0.03 | 0.02 | -0.03 |
| 5 300 | 5309 | -0.50 | -0.42 | -0.35 | -0.24 | -0.24 | -0.19 | -0.24 |
| 5 600 | 5623 | -0.70 | -0.66 | -0.61 | -0.51 | -0.51 | -0.45 | -0.48 |
| 6 000 | 5957 | -0.83 | -0.85 | -0.86 | -0.77 | -0.77 | -0.73 | -0.79 |
| 6 300 | 6310 | -0.84 | -0.94 | -1.01 | -0.97 | -0.98 | -0.94 | -1.03 |
| 6 700 | 6683 | -0.76 | -0.95 | -1.08 | -1.11 | -1.14 | -1.12 | -1.21 |
| 7 100 | 7080 | -0.60 | -0.82 | -1.04 | -1.14 | -1.19 | -1.19 | -1.28 |
| 7 500 | 7499 | -0.42 | -0.64 | -0.90 | -1.05 | -1.13 | -1.14 | -1.22 |
| 8 000 | 7943 | -0.30 | -0.47 | -0.72 | -0.87 | -0.96 | -0.96 | -1.05 |
| 8 500 | 8414 | -0.31 | -0.36 | -0.55 | -0.66 | -0.74 | -0.72 | -0.76 |
| 9 000 | 8913 | -0.59 | -0.47 | -0.54 | -0.55 | -0.56 | -0.53 | -0.62 |
| 9 500 | 9441 | -1.06 | -0.82 | -0.73 | -0.63 | -0.56 | -0.50 | -0.64 |
| 10 000 | 10000 | -1.52 | -1.30 | -1.11 | -0.88 | -0.77 | -0.68 | -0.88 |
| 10 600 | 10593 | -1.77 | -1.77 | -1.63 | -1.30 | -1.14 | -1.04 | -1.17 |
| 11 200 | 11220 | -1.75 | -2.08 | -2.23 | -2.12 | -1.90 | -1.81 | -1.94 |
| 11 800 | 11885 | -1.27 | -1.98 | -2.49 | -2.70 | -2.54 | -2.51 | -2.47 |
| 12 500 | 12589 | -1.33 | -1.55 | -2.00 | -2.54 | -2.61 | -2.57 | -2.69 |
| 13 200 | 13335 | -1.57 | -1.52 | -1.76 | -2.16 | -2.21 | -2.15 | -2.25 |
| 14 000 | 14125 | -2.24 | -1.97 | -1.90 | -1.90 | -1.80 | -1.61 | -1.76 |
| 15 000 | 14962 | -2.76 | -2.76 | -2.63 | -2.29 | -1.93 | -1.66 | -1.76 |
| 16 000 | 15849 | -2.76 | -3.17 | -3.37 | -3.29 | -2.91 | -2.61 | -2.78 |

# Appendix 2 – Instructions for legal applications

Only calibrated instruments should be used when measurements are made for legal purposes. The Nova sound level meter has been designed according to the IEC 61672-1 standard and can therefore be approved.

## Information for performing electrical tests

The Pulsar Instruments dummy microphone type KP:66 is recommended. The KP:66 has a capacitance 18 pF and an input sensitivity is nominally 50 mV/Pa (see section 5.1.15 – page 7). The maximum input voltage at the input to the dummy microphone is 30 $V_{pk-pk}$

| | $L_A$ (dB) | | $L_C$ (dB) | | $L_Z$ (dB) | | $L_{Aeq,T}$ (dB) | | $L_{AE}$ (dB) ($t_{int}$ = 30 s) | | $L_{Cpeak}$ (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 31.5 Hz | from | 24 | from | 30 | from | 45 | from | 24 | from | 39 | | |
| | to | 99 | to | 136 | to | 139 | to | 99 | to | 114 | | |
| | start | 94 | start | 94 | start | 94 | start | 94 | start | 109 | | |
| 1 kHz | from | 24 | from | 30 | from | 45 | from | 24 | from | 39 | from | 50 |
| | to | 139 | to | 139 | to | 139 | to | 139 | to | 154 | to | 142 |
| | start | 94 | start | 94 | start | 94 | start | 94 | start | 109 | | |
| 12.5 kHz | from | 24 | from | 30 | from | 45 | from | 24 | from | 39 | | |
| | to | 134 | to | 133 | to | 138 | to | 134 | to | 149 | | |
| | start | 94 | start | 94 | start | 94 | start | 94 | start | 109 | | |

# Appendix 3 – Octave Band Filters

This appendix contains information about the octave band filters required by the IEC 61260:1995 standard. The following table lists the required information.

| | |
|---|---|
| Statement of conformity | All the available filters comply with all the performance requirements of IEC 61260:1995 for the instrument's performance class. |
| Sampling frequency | 96 kHz |
| Midband frequencies | See table below |
| Frequency ratio | G = 2 |
| Reference level range | N/A (the Nova sound level meters have a single measurement range) |
| Reference input signal level | 1 µV |
| Reference attenuation | 0 dB |
| Linear range | See table below |
| Recommendation to operate the instrument within the linear range | N/A (the Nova sound level meters have a single measurement range) |
| Real-time operation frequency range | Octave-band filters: 31.5 Hz to 16 kHz |
| Flat frequency response | 32.5 Hz to 16 kHz |
| Maximum input signal | 10.6 $V_{rms}$ |
| Terminating impedance | N/A |
| Temperature | Operating: -10 to +50 °C<br>Storage: -20 to +60 °C<br>No permanent damage to the instrument when kept within those temperature ranges. |
| Limitations on operation in proximity to sources of alternating magnetic fields | None (see section 9.3o – A.C. power-frequency and radio-frequency susceptibility – page 21)<br>The Nova electromagnetic performances comply with IEC 61672-1:2013 |
| Limitation on operation in proximity to sources of electrostatic discharge | None (see section 6.5.2 Electrostatic discharge) |
| Limitation on operation in proximity to sources of radio-frequency electromagnetic fields | None (see section 9.3o – A.C. power-frequency and radio-frequency susceptibility)<br>The Nova electromagnetic performances comply with IEC 61672-1:2013 |
| Battery indicator | See "User manual for the Nova sound level meters", page 18 |
| Model of associated sound level meter | N/A (the filters are an integral part of the Nova sound level meters) |
| Stabilization time | See section 9.3l – Typical stabilization time after changes in environmental conditions |

## Midband frequencies

| Nominal midband frequency (Hz) | Exact midband frequency (Hz) | Octave | Third-octave |
|---|---|---|---|
| 31.5 | 31.250 | • | • |
| 63 | 62.500 | • | • |
| 125 | 125.000 | • | • |
| 250 | 250.00 | • | • |
| 500 | 500.00 | • | • |
| 1 000 | 1 000.0 | • | • |
| 2 000 | 2 000.0 | • | • |
| 4 000 | 4 000.0 | • | • |
| 8 000 | 8 000.0 | • | • |
| 16 000 | 16 000 | • | • |

Linear operating range

| Nominal midband frequency (Hz) | Range (dB) |
|---|---|
| 31.5 | 25-139 |
| 63 | 23-139 |
| 125 | 21-139 |
| 250 | 18-139 |
| 500 | 18-139 |
| 1 000 | 20-139 |
| 2 000 | 22.139 |
| 4 000 | 25-139 |
| 8 000 | 28-139 |
| 16 000 | 33-139 |

Starting point 94dB.

Note that the upper limits on the linearity range are affected by the calibration offset. Nova instruments are factory-adjusted to a zero calibration offset and will have the upper limits shown above. If a different microphone capsule is fitted or the microphone sensitivity changes, resulting in a negative calibration offset, the upper limits will be reduced by the value of the offset. For example: a calibration offset of -2.0 dB will result in an upper limit of 138 dB at 1 kHz.

# Appendix 4 - SLM use in official or commercial circulation (according to MEV)

*Verwendung des SPM im amtlichen oder geschäftlichen Verkehr (gemäß MEV)*

This appendix details the approved equipment and configuration options.

Die zugelassenen Geräte (Klasse 1 gemäß DIN EN 61672:2014) sind folgende:
*The approved configurations (class 1 according to DIN EN 61672:2014) is as follows:*

| | |
|---|---|
| Mikrofon:<br>*Microphone:* | PM1 Halbzoll Freifeld polarisiert mit entfernbarem Schutzgitter<br>*PM1 ½“ free field Pre-polarised with removable protection drid* |
| Vorverstärker:<br>*Preamplifier:* | PM40 abnehmbarer Vorverstärker<br>*PM40 Removable Preampifier* |
| Kabel:<br>*Cable:* | PSR205 Mikrofonkabel<br>*PSR205 microphone cable* |
| Windschirm:<br>*Windscreen:* | WS90 Windschirm, 90 mm<br>*WS90 windshield, 90 mm o.d.* |
| | Spezifikation<br>*Specification* |
| Konfiguration:<br>*Configuration:* | Referenzrichtung 0°<br>*Reference direction 0°* |
| | mit oder ohne PSR205 Mikrofonkabel<br>*with or without PSR205 microphone cable* |
| | mit oder ohne Windschirm<br>*with or without windscreen* |
| Netzteil:<br>*Mains adapter:* | *kein*<br>*None* |
| Weiteres Zubehör:<br>*Other accessories:* | *kein*<br>*None* |
| Hardware-Version: | *Rev B* |
| Software-Version: | *V2.4.2.279* |
| Kalibrator:<br>*Calibrator:* | *Model 105*<br>*Model 105* |
| | *94dB*<br>*94dB* |
| | *Kalibrieroffset -0.3dB gegenüber Freifeld*<br>*Calibration offset -0/3dB pressure to freefield* |

Auf folgenden Seiten des Nova Handbuchs oder im Handbuch Nova Teil B Technische Daten finden Sie Informationen zu…
*On the following pages of the Nova User Manual or Part B Technical Data you will find information to...*

- Aufbau und Anschluss aller Komponenten: *Nova Handbuch Seite 13*
- *Installation and connection of all components: User Manual page 13.*
- Kalibrierung: *Nova Handbuch Seite 21*

- *calibration:* Nova *User Manual Page 21*

- Start, Stop, Reset: *Nova Teil B Technische Daten Seiten 7*
- *start, stop, reset: Nova User Technical part B Page 7*

- Gehäuse- und Windschirmkorrekturen: *Nova Teil B Technische Daten Seiten 17 / 18*
- *Case and windscreen corrections*: *Part B – Technical Data – Page 17 and 18*

Gemäß DIN EN 61672:2014 wurde das Gerät unter folgenden Bedingungen geprüft:
*According to DIN EN 61672:2014 the slm was tested at the following conditions:*

- Frequenzbereich (Freifeldfrequenzgang): 20 Hz bis 20 kHz
- *Frequency range (free-field frequency response): 20 Hz to 20 kHz*

- Pegelbereich: siehe lineare Arbeitsbereiche im *Nova Teil B Technische Daten Seite 19*
- *Level range: see linear operating ranges on page 19 of the Nova Part B – Technical Data Manual*

  - Einschränkungen des linearen Arbeitsbereiches durch mechanische Schwingungen bis 1 m/s² siehe *Nova Teil B Technische Daten Seite 10*
  - *Limitations of the linear operating range caused by mechanical vibrations up to 1 m/s² see page 10 of the Nova Part B – Technical Data Manual*

- Temperaturbereich -10 °C ... 50 °C
- *Temperature range -10°C ... 50°C*

- Statischer Luftdruck 65 kPa ... 108 kPa
- *Static air pressure 65 kPa ... 108 kPa*

- Luftfeuchte 25 % r.h. ... 90 % r.h
- *Air humidity 25 % r.h. ... 90 % r.h.*

- Elektrostatische Entladungen: bis 4 kV bei Berührung, bis 8 kV über eine Luftstrecke
- *Electrostatic discharge: up to 4 kV contact-discharge, up to 8 kV air-discharge*
-
- Felder mit Netzfrequenz: bis zu einem Effektivwert von 80 A/m
- *AC-power frequency: up to an effective value of 80 A/m*

- Hochfrequente Felder von 26 MHz bis 1 GHz: bis zu einem Effektivwert von 10 V/m
- *Radio frequency from 26 MHz to 1 GHz: up to an effective value of 10 V/m*

- Hochfrequente Felder von 1,4 GHz bis 2,0 GHz: bis zu einem Effektivwert von 3 V/m
- *Radio frequency from 1.4 GHz to 2.0 GHz: up to an effective value of 3 V/m*

- Hochfrequente Felder von 2,0 GHz bis 2,7 GHz: bis zu einem Effektivwert von 1 V/m
- *Radio frequency from 2.0 GHz to 2.7 GHz: up to an effective value of 1 V/m*

Für periodische Prüfungen zu beachten:

*To consider for periodical tests:*

- Einspeisung elektrischer Signale mit Adapter: *KP:66, elektrische Kenngrößen*
Seite 7 Handbuch Nova Teil B- Technische Daten
- *Input of electrical signals with adapter: KP:66 Electrical Adaptor*
*See page 7 of the Nova Part B – Technical Data Manual*

- Korrekturwerte Multifrequenzkalibrator:
Seite 19 Handbuch Nova Teil B- Technische Daten
- *Correction values of multi frequency calibrator: page 19 of the Nova Part B Technical Data Manual*

## Pulsar Instruments Offices

The addresses given below are the Pulsar Instruments plc offices. Pulsar Instruments plc also have approved distributors and agents is many countries worldwide. For details of your local representative, please contact Pulsar Instruments plc at the address below. Contact details for Pulsar Instruments authorised distributors and agents are also available from the Internet Web site at the address shown below.

### Main Office

Pulsar Instruments plc
The Evron Centre
John Street
Filey
North Yorkshire
YO14 9DW

| | |
|---|---|
| Tel: | +44 1723 518011 |
| Fax: | +44 1723 518043 |
| E-mail: | sales@pulsarinstruments.com |
| Web Site: | www.pulsarinstruments.com |