

# INSTRUCTION MANUAL

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Microphone Type 4966  
for Hand-held Analyzer  
Types 2250, 2250-L and 2270

Supplement to Instruction Manual BE 1712

BE 1897–11  
English



# **Microphone Type 4966 for Hand-held Analyzer Types 2250, 2250-L and 2270**

**Type 2250: From Hardware Version 1.1**

**Type 2250-L: From Hardware Version 2.0**

**Type 2270: From Hardware Version 3.0**

## **Supplement to Instruction Manual BE 1712**

## Health and Safety Considerations

This apparatus has been designed and tested in accordance with IEC/EN 61010-1 and ANSI/UL 61010-1 *Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use*. This manual contains information and warnings which must be followed to ensure safe operation and to retain the apparatus in safe condition.

## Safety Symbols and Signal Words Used



The apparatus will be marked with this symbol when it is important that you refer to the associated danger or warning statement given in this manual



The manual uses this symbol when a danger or warning statement is applicable



Hazardous Voltage/Electricity. Both the apparatus and manual use this symbol when there is a risk for shock or electrocution



Hot Surface. This manual will use this symbol when there is a risk for burning or scalding



Earth (Ground) Terminal. The apparatus will be marked with this symbol when applicable



Protective Conductor Terminal. The apparatus will be marked with this symbol when applicable



Alternating Current. The apparatus will be marked with this symbol when applicable

### Danger

Signals an imminent hazardous situation, which, if not avoided, will result in death or serious injury

### Warning

Signals a possibly hazardous situation, which, if not avoided, will result in death or serious injury

### Caution

Signals a hazardous situation, which, if not avoided, could result in minor or moderate injury or damage to the apparatus

### Notice

Signals a situation or practice that requires attention, but does not directly result in personal injury if ignored

## Risks and Hazards

### Explosion Hazards



**Danger:** The apparatus is not designed to be used in potentially explosive environments. It should not be operated in the presence of flammable liquids or gases

### Electrical Hazards



**Warning:** Any adjustment, maintenance and repair of the open apparatus under voltage must be avoided as far as possible and, if unavoidable, must be carried out only by trained service

**Caution:** Switch off all power to equipment before connecting or disconnecting their digital interface. Failure to do so could damage the equipment

### Mechanical Hazards

**Caution:** Whenever it is likely that the correct function or operating safety of the apparatus has been impaired, it must be made inoperative and be secured against unintended operation

### Waste Handling



Brüel & Kjær complies with the EU's Waste Electrical and Electronic Equipment (WEEE) Directive, which issues the following waste handling instructions:

- Do not dispose of electronic equipment or batteries as unsorted municipal waste
- It is your responsibility to contribute to a clean and healthy environment by using the appropriate local return and collection systems
- Hazardous substances in electronic equipment or batteries may have detrimental effects on the environment and human health
- The symbol shown to the left indicates that separate collection systems must be used for any discarded equipment or batteries marked with that symbol
- Waste electrical and electronic equipment or batteries may be returned to your local Brüel & Kjær representative or to Brüel & Kjær Headquarters for disposal



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# Chapter 1

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## Introduction

### 1.1 About This Supplement

This document is a supplement, to Instruction Manual for Hand-held Analyzer Types 2250, 2250-L and 2270 BE 1712. It provides the information relevant when Hand-held Analyzer Type 2250, 2250-L or 2270 is configured with Free-field ½" Condenser Microphone Type 4966.

The combination of Free-field ½" Condenser Microphone Type 4966 and the hand-held analyzer is intended for general purpose use.

**The numbering of chapters, sections, figures and tables in this supplement corresponds to Instruction Manual BE 1712. This supplement only contains content that is different from the instruction manual and is specific to this microphone configuration. The other chapters, sections, figures and tables should be read in Instruction Manual BE 1712.**

Also see section 1.1 of the instruction manual.

### 1.2 System Overview

#### 1.2.4 Hardware Setup

This section provides an overview of the additional hardware components used when the analyzers are configured with Microphone Type 4966. The other hardware components can be found in Instruction Manual BE 1712, section 1.2.4.

**Table 1.1**  
*Additional hardware components needed for conformance testing of the analyzers configured with Type 4966*

Quantity*	Brüel & Kjær Type/Part Number	Description
1 or 2	Type 4966	Free-field ½" Condenser Microphone

\* Quantity depends on which analyzer is to be tested.

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# Chapter 2

## Information Required by the Standards

### 2.1 Introduction

This chapter contains the detailed information required by the standards to be described in the Instruction Manual.

**No additional information is required in Chapter 2 when using Microphone Type 4966 together with the analyzer.**



# Chapter 3

## Conformance Testing

### 3.1 Introduction

This chapter contains the detailed information required by the standards to be described in the Instruction Manual.

ion needed to conduct conformance testing according to the specified standards.

**No additional information is required in Chapter 3 when using Microphone Type 4966 together with the analyzer.**

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# Chapter 4

## Specifications

### 4.1 Specifications

Specifications are given for the configuration detailed in Chapter 1.

Unless specifically noted, specifications are given as typical data under Reference Environmental Conditions, and with the system calibrated to the nominal microphone open circuit sensitivity.

 **Please note:** The specifications given here for the Z-weighting, as defined in IEC 61672-1, are also valid for the Lin response, as defined in IEC 60651.

### 4.5 Microphone

Microphone Type 4966 and Microphone Preamplifier ZC-0032:

**Type:** Prepolarized Free-field ½ " Condenser Microphone

**Nominal Open Circuit Sensitivity:** 50 mV/Pa, (corresponding to –26 dB re 1 V/Pa) ± 1.5 dB

**Capacitance:** 14 pF (at 250 Hz)

**Nominal Preamplifier Attenuation:** 0.25 dB

**Extension Cables between Microphone Preamplifier ZC-0032 and the Analyzer:** Up to 100 m without degradation of the specifications.

 **Please note:** EMC is only tested with a 10 m cable (AO-0697-D-100)

**Microphone Reference Point:** The centre of the front surface of the microphone protection grid.

**Reference Direction of Sound Incidence:** See the small drawings in the lower right corner of the directional response graphs in section 4.7.

### 4.6 Frequency Responses

#### 4.6.2 Typical Low-frequency Responses

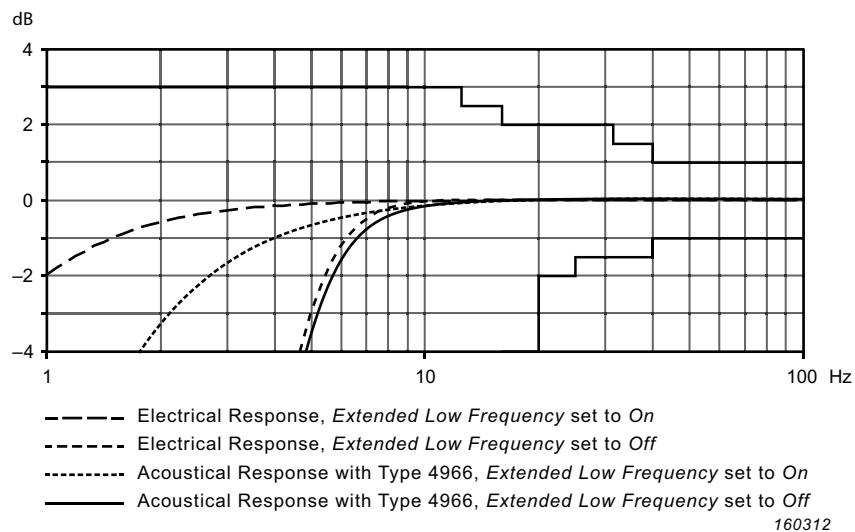
The typical Low-frequency Responses for Z frequency weighting are given in Fig.4.2. The Electrical Responses are for the Rear Input socket. The Acoustical Responses include Microphone Type 4966 and Microphone Preamplifier ZC-0032.

The Low-frequency Responses depends on the state of the **Low Frequency** parameter under **Setup > Frequency Settings**.

The Low-frequency Responses are not influenced by the microphone accessories described in section 1.2.4.

The Low-frequency Responses for introduction of the electrical signal through the recommended means to substitute the microphone with an electrical input facility (see section 3.5) differs from the electrical responses in Fig.4.2 because it also includes Microphone Preamplifier ZC-0032.

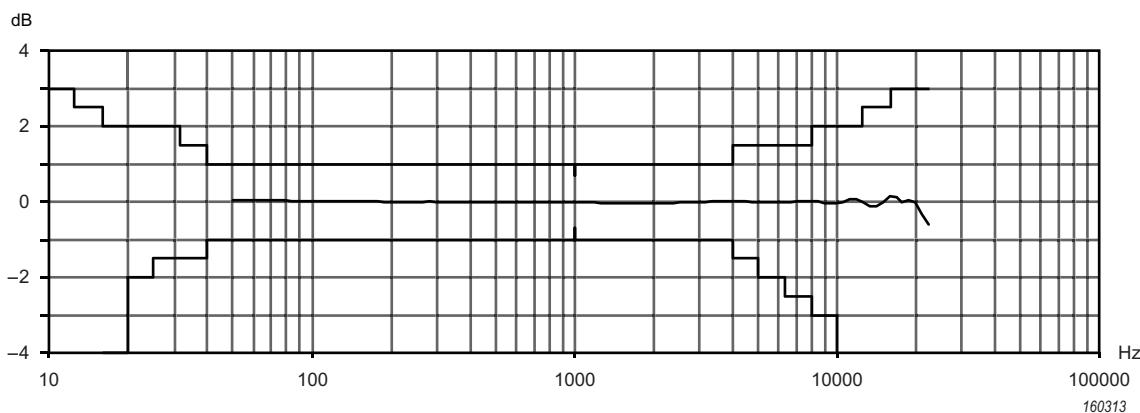
**Fig. 4.2** Typical low-frequency responses



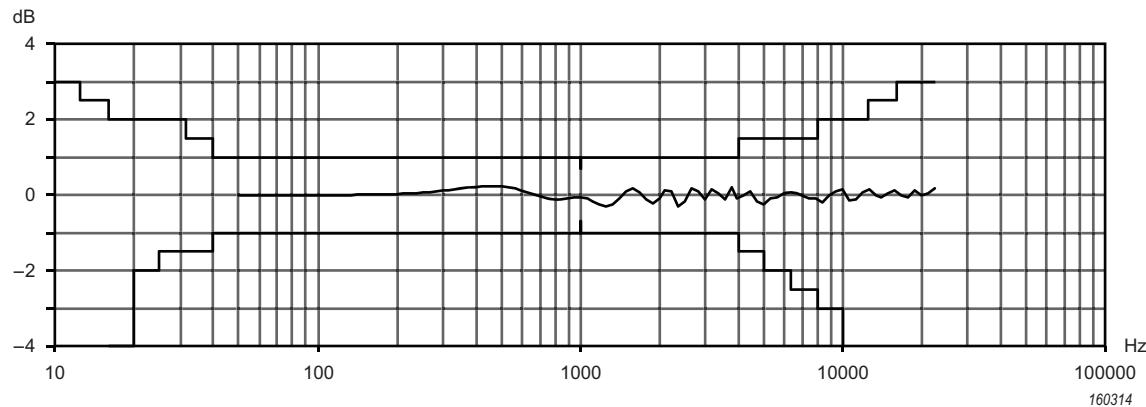
#### 4.6.5 Free-field Frequency Responses

The free-field frequency responses for plane progressive sinusoidal sound waves incident from the reference direction with Z frequency weighting are provided in Fig.4.3 to Fig.4.8 and Table A.2 to Table A.6. The tables also provides the 'Expanded Uncertainties of Measurement' required by IEC 61672-1, see the start of section 4.6.2.

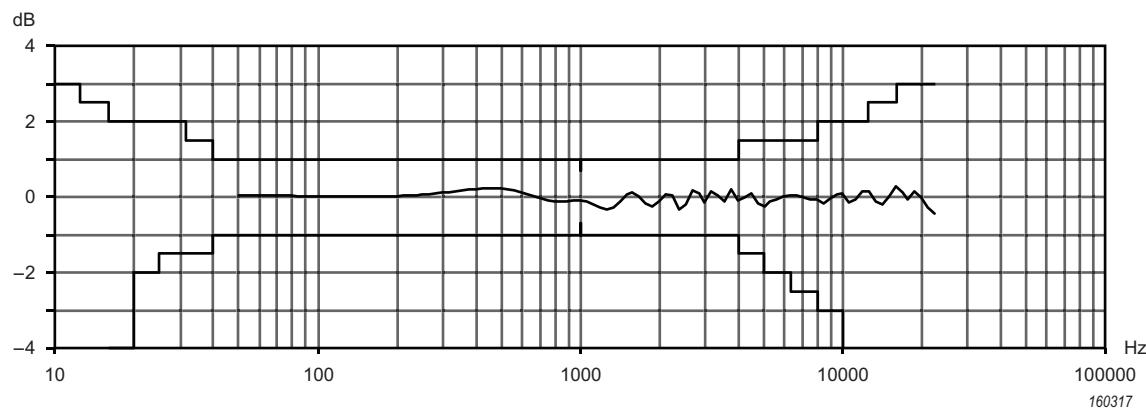
**Fig. 4.3** Free-field 0° frequency response for Microphone Type 4966, Microphone Preamplifier ZC-0032 and the analyzer's electrical response, with the microphone preamplifier connected to a microphone extension cable. Corresponds to the "Acoustical Response" column in Table A.2



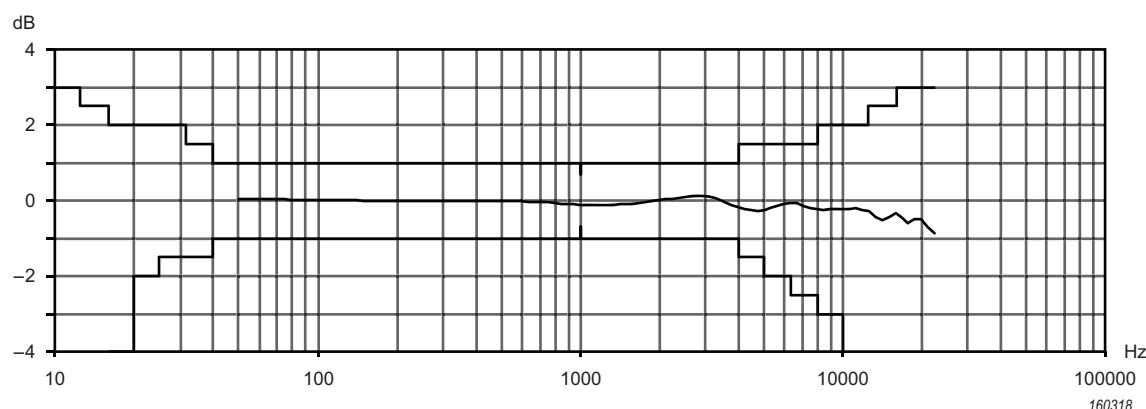
**Fig. 4.4** Influence of the analyzer's body on free-field 0° response, corresponds to the "Body Influence" column in Table A.3



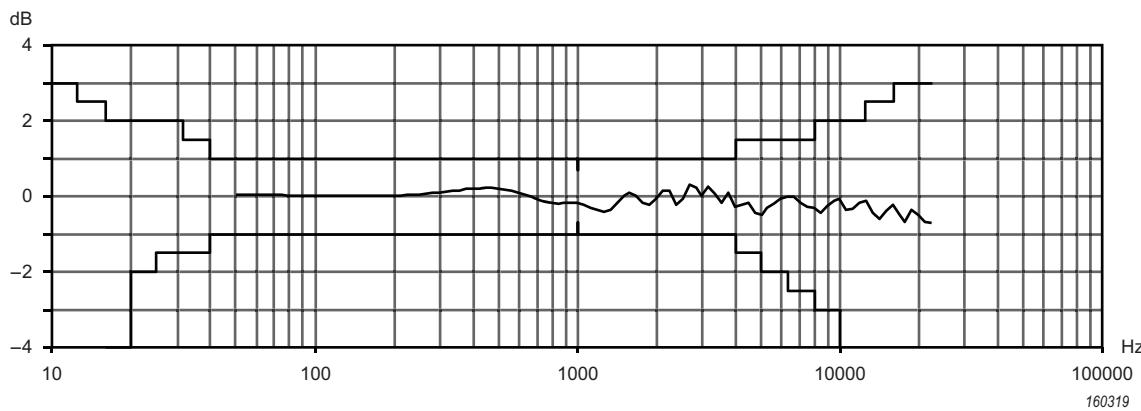
**Fig. 4.5** Free-field 0° frequency response for Microphone Type 4966, Microphone Preamplifier ZC-0032 and the analyzer with the microphone preamplifier mounted directly on the analyzer. Corresponds to the "Acoustical Response" column in Table A.3



**Fig. 4.6** Free-field 0° frequency response for Windscreen UA-1650, Microphone Type 4966, Microphone Preamplifier ZC-0032 and the analyzer's electrical response, with the microphone preamplifier connected to a microphone extension cable. Corresponds to the "Acoustical Response" column in Table A.4



**Fig. 4.7** Free-field 0° frequency response for Windscreen UA-1650, Microphone Type 4966, Microphone Preamplifier ZC-0032 and the analyzer with the microphone preamplifier mounted directly on the analyzer. Corresponds to the “Acoustical Response” column in Table A.5



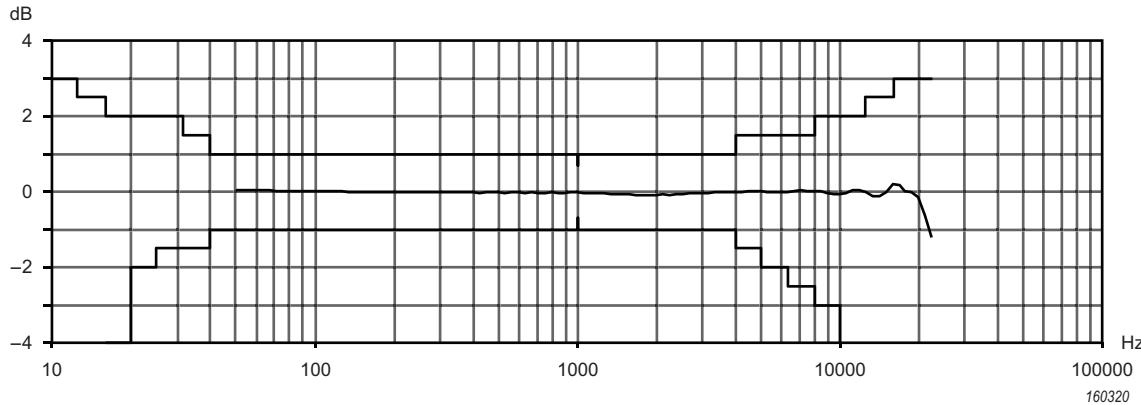
**Fig. 4.8** Microphone Type 4966 is not specified together with Outdoor Microphone Kit UA-1404

#### 4.6.6 Diffuse-field Frequency Responses

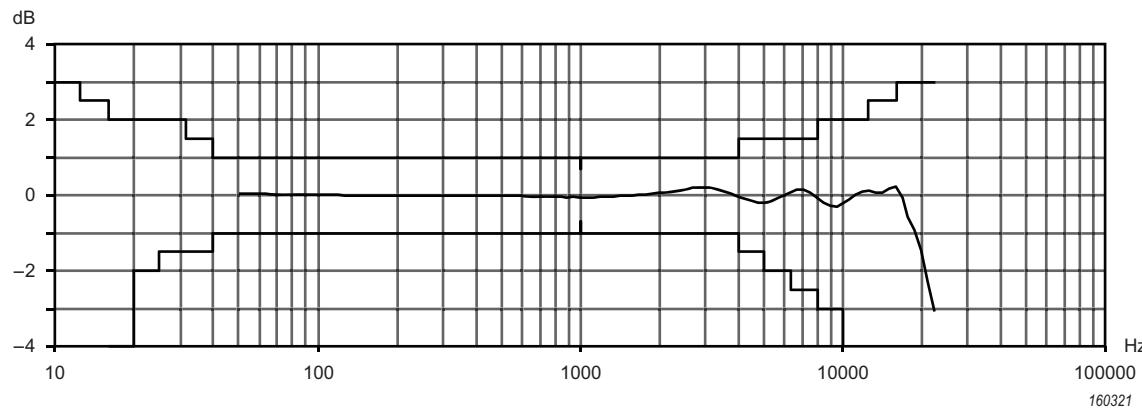
The diffuse-field frequency responses (also called random-incidence frequency responses) with Z frequency weighting are provided in Fig.4.9 to Fig.4.11 and Table A.7 to Table A.9.

The diffuse-field body influence of the analyzer is so small that the diffuse-field frequency responses are the same with and without the microphone preamplifier connected to the microphone extension cable.

**Fig. 4.9** Diffuse-field frequency response for Microphone Type 4966, Microphone Preamplifier ZC-0032 and the analyzer with or without the microphone preamplifier connected to a microphone extension cable. Corresponds to the “Acoustical Response” column in Table A.7



**Fig. 4.10** Diffuse-field frequency response for Windscreen UA-1650, Microphone Type 4966, Microphone Preamplifier ZC-0032 and the analyzer with or without the microphone preamplifier connected to a microphone extension cable. Corresponds to the "Acoustical Response" column in Table A.8



**Fig. 4.11** Microphone Type 4966 is not specified together with Outdoor Microphone Kit UA-1404

#### 4.6.7 Free-field Frequency Responses for Diffuse-field Calibrated Instruments

According to IEC 60651 and IEC 60804, the free-field frequency responses in the reference direction for diffuse-field calibrated instruments must be specified. These responses are given in Table A.10.

### 4.7 Directional Responses

This section gives directional responses for plane progressive sinusoidal sound waves normalised to the response in the reference direction. Both influence of body and accessories, and the resulting directional responses are given as tables in Appendix A. Only the resulting directional responses are given here as graphs.

The sensitivity variation graphs show the absolute maximum difference between the sensitivities at any two sound incidence angles within the specified interval of angles. For example, at each frequency the value for  $\pm 30^\circ$  is the difference between the highest and the lowest sensitivity found in a circular cone with an opening angle of  $60^\circ$ , the top at the position of the microphone and with the reference direction of incidence as the axis. Because the angle interval defines a three-dimensional geometric shape there is only one set of graphs with sensitivity variations, also where the directional response is shown for two planes. The graphs show the maximum variation for the two measurement planes combined. The sensitivity variations are also given as tables in Appendix A.

Limit curves are drawn on the sensitivity variation graphs in the following sections. These curves represent the IEC 61672-1:2002 limits, reduced by the 'Maximum Expanded Uncertainties of Measurement' from Appendix A of IEC 61672-1:2002. The 'Maximum Expanded Uncertainties of Measurement' used here are the maximum uncertainties that a test organisation may have on its measurements when it performs conformance tests according to IEC 61672:2002.

IEC 61672-1:2013 deals with uncertainty of measurement differently than the 2002 version; therefore, the terminology around the limit curves is different. Seen from an IEC 61672-1:2013 perspective, the limit curves are the standard's acceptance limits.

IEC 61672-1:2013 defines relative directional response in clause 3.17.

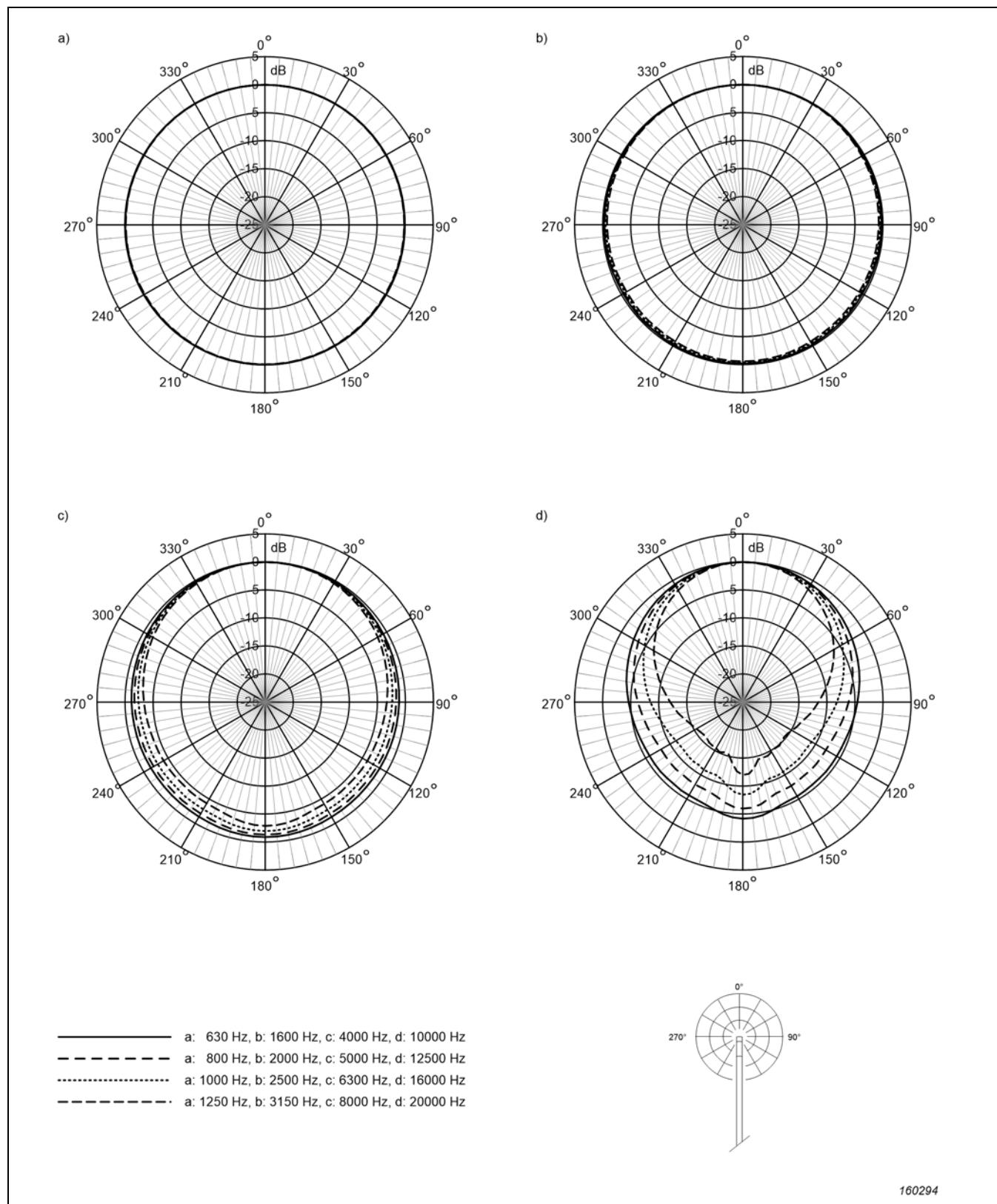
The relative directional response for a reference angle can be derived from the specified directional response by normalization with the values (in decibels) in the reference direction; i.e., for each frequency the value at the reference direction is subtracted from the values at all angles so that the resulting value in the reference direction is 0 dB.

IEC 61672-1:2013 requires information on the directivity index.

The directivity index definition in the standard is not very precise; therefore, we have chosen to use the definition in IEC 61183:1994 chapter 4 so that the directivity index in decibels equals the difference between the free-field response in the reference direction and the diffuse-field response without the analyzers electrical responses.

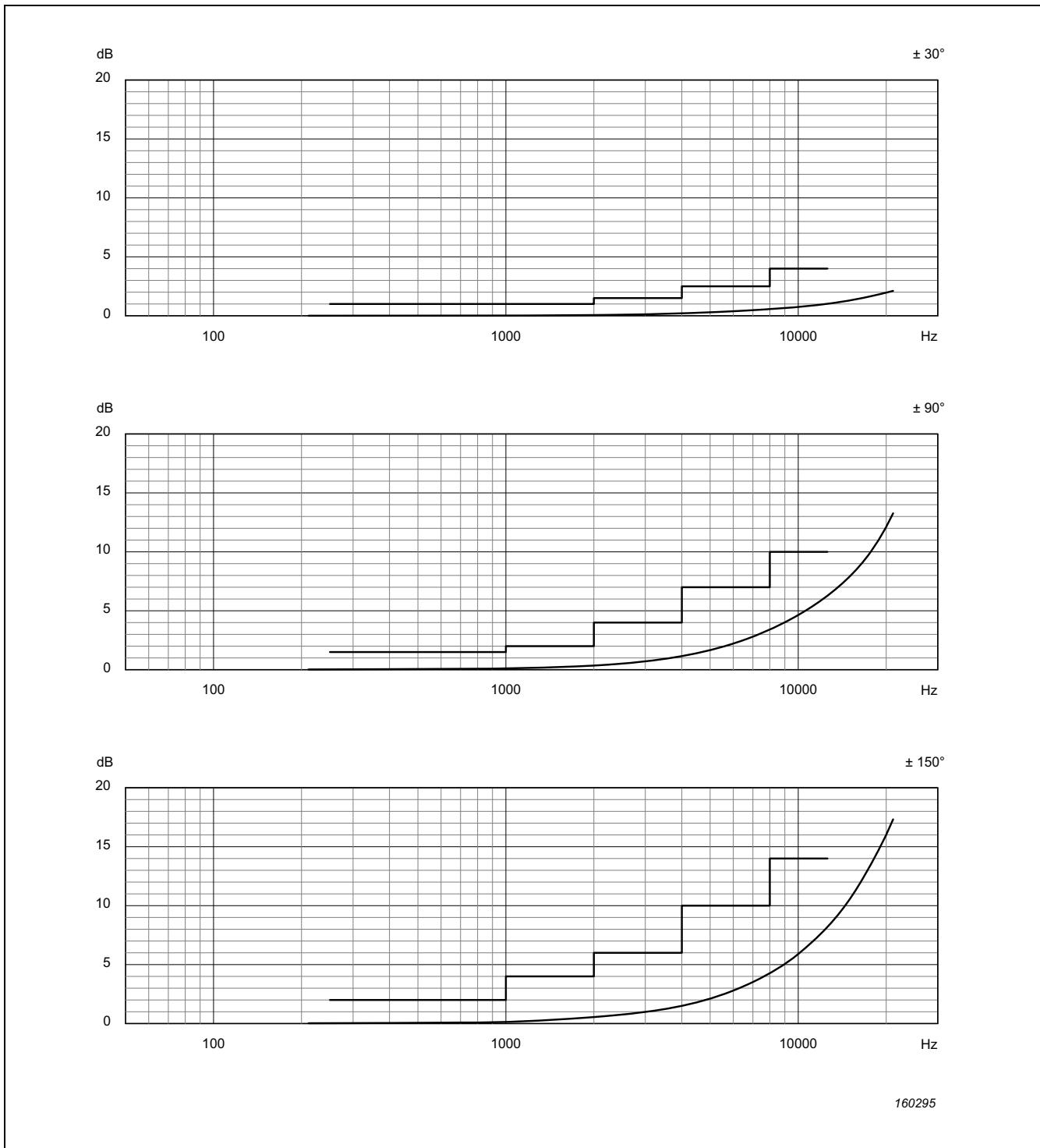
The directivity index for a specific microphone configuration can therefore be found by subtracting the Acoustical Response column minus the Electrical Response column in the relevant diffuse-field table (Table A.7 to Table A.9), from the Acoustical Response column minus the Electrical Response column in the relevant free-field table (Table A.2 to Table A.6).

**Fig. 4.12** Directional response for Microphone Type 4966 and Microphone Preamplifier ZC-0032 with the microphone preamplifier connected to a microphone extension cable. Corresponds to Table A.11 to Table A.13

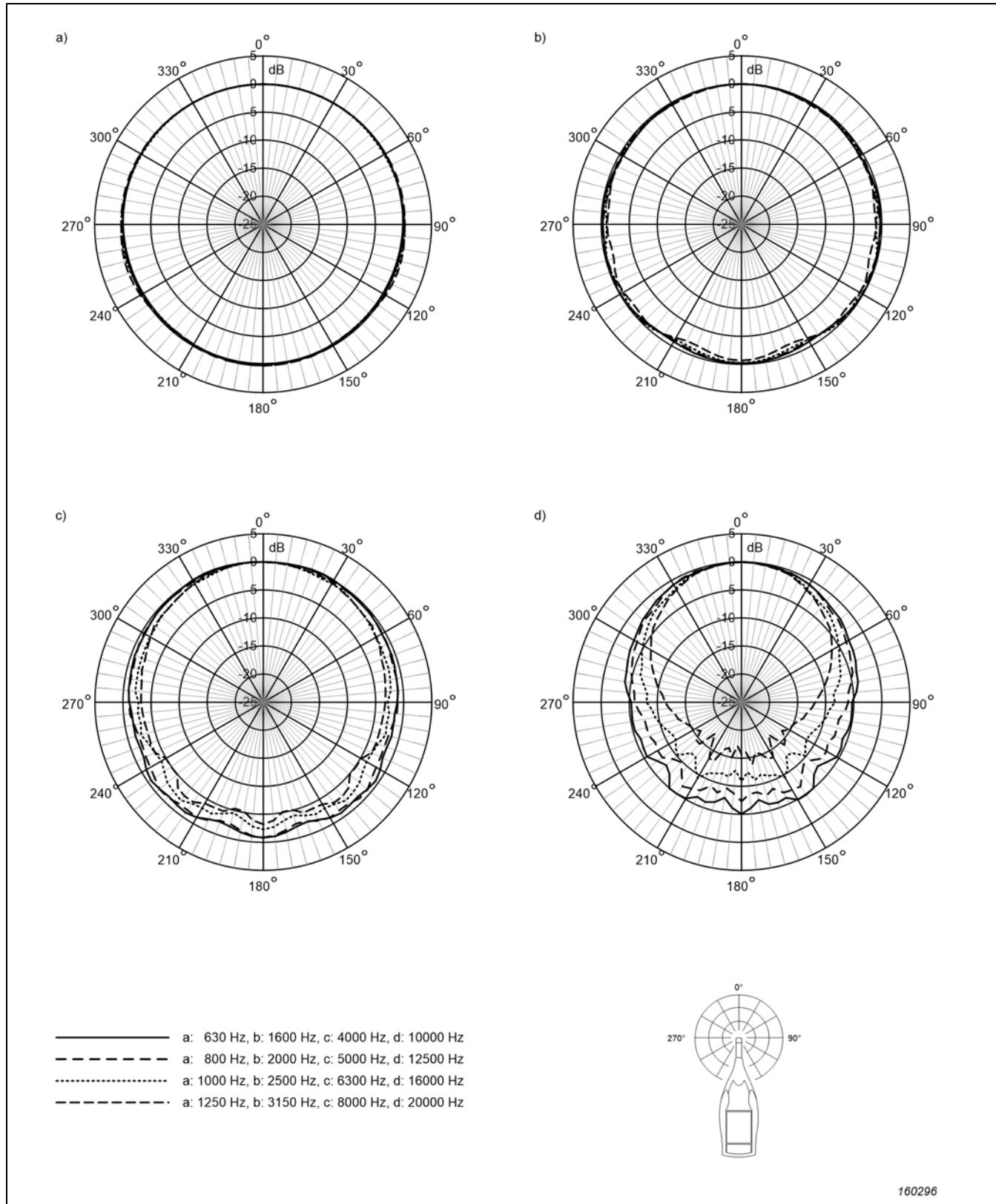


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**Fig. 4.13** Sensitivity variations for Microphone Type 4966 and Microphone Preamplifier ZC-0032 with the microphone preamplifier connected to a microphone extension cable, at sound incidence angles within  $\pm\theta^\circ$  from the reference direction. Corresponds to Table A.14

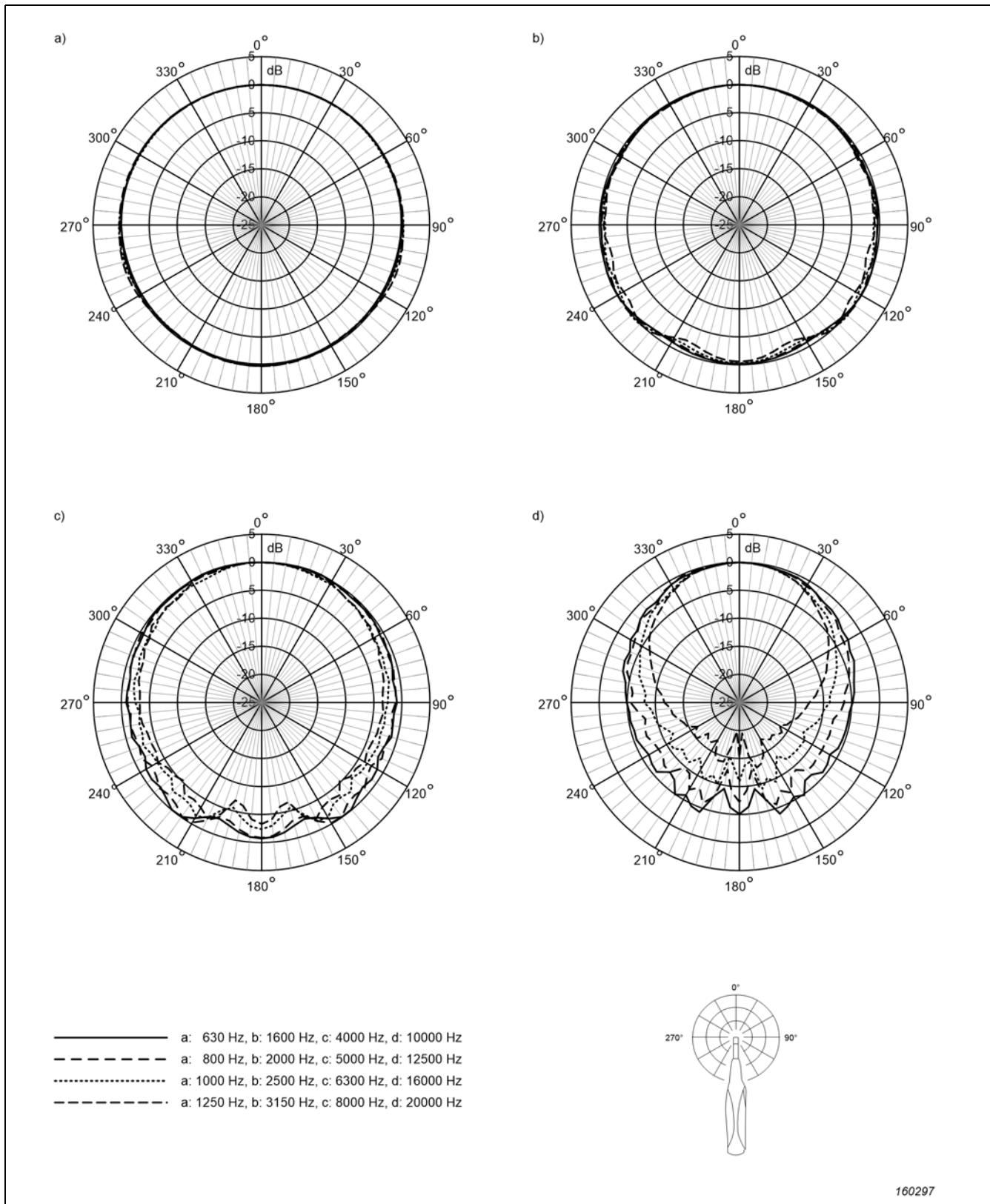


**Fig. 4.14** Directional response for Microphone Type 4966, Microphone Preamplifier ZC-0032 and the analyzer with the microphone preamplifier mounted directly on the analyzer, measured in a plane parallel to the display and along the microphone axis. Corresponds to Table A.21 to Table A.23

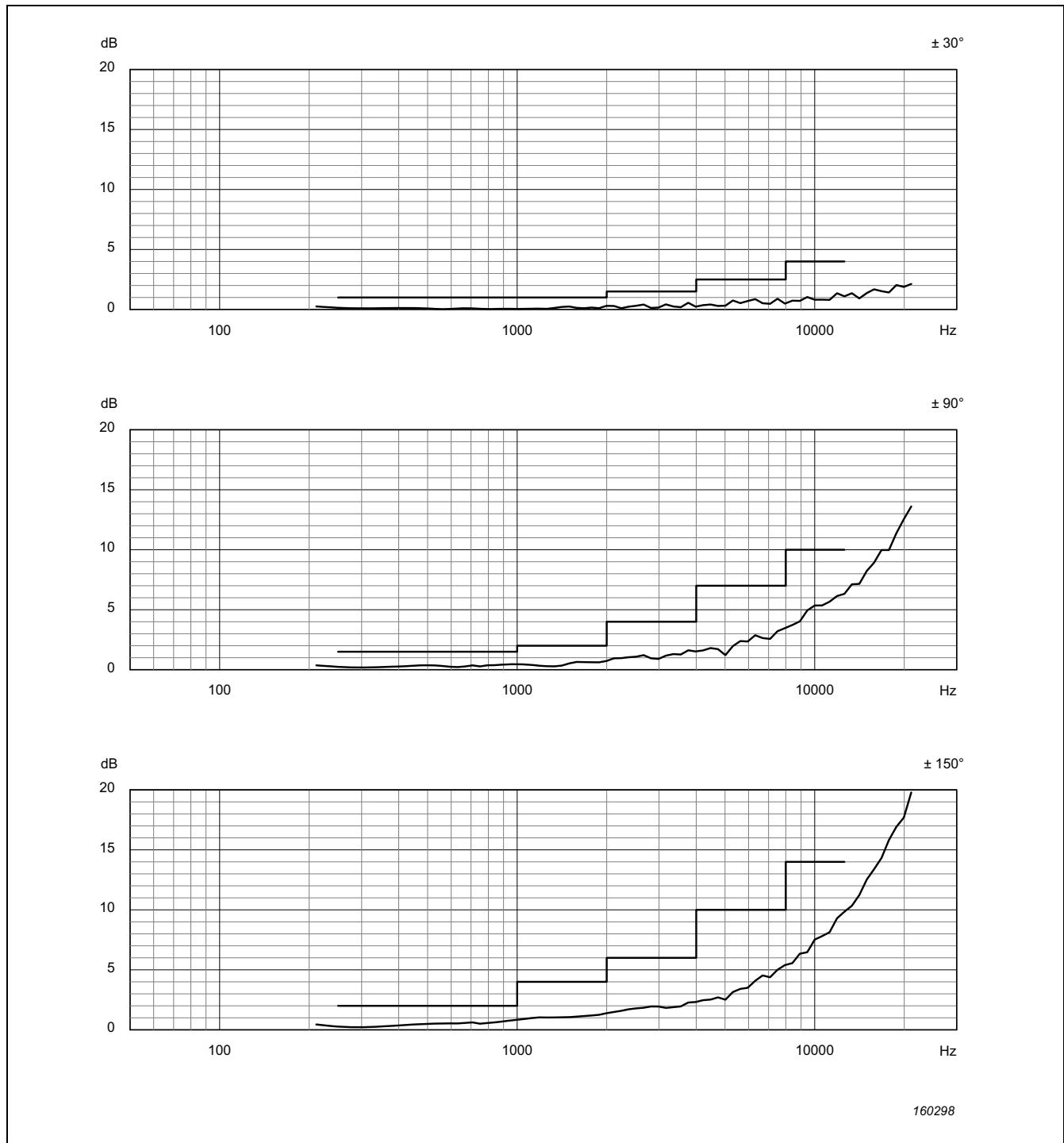


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**Fig. 4.15** Directional response for Microphone Type 4966, Microphone Preamplifier ZC-0032 and the analyzer with the microphone preamplifier mounted directly on the analyzer, measured in a plane perpendicular to the display and along the microphone axis. Corresponds to Table A.24 to Table A.26

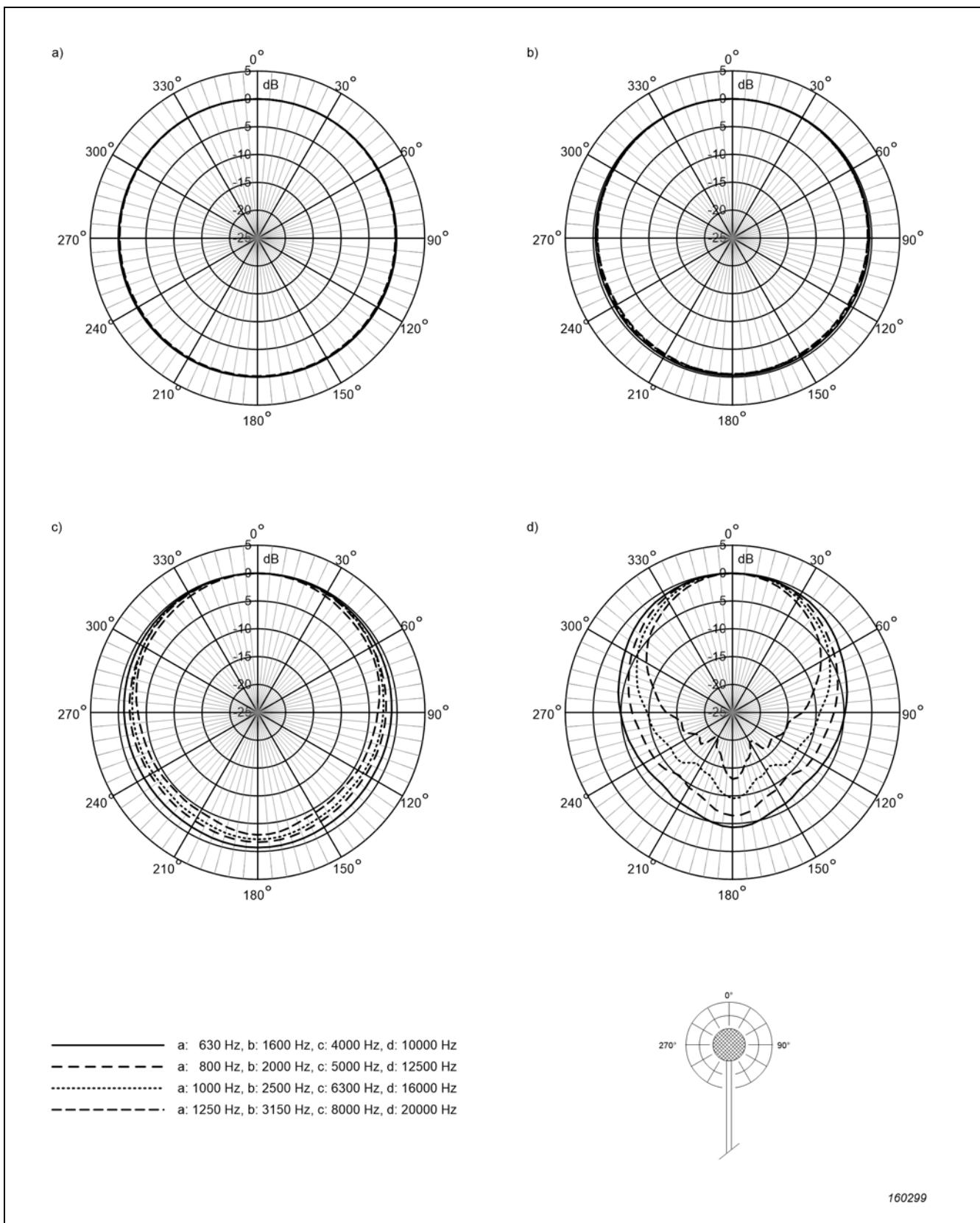


**Fig. 4.16** Sensitivity variations of Microphone Type 4966, Microphone Preamplifier ZC-0032 and the analyzer with the microphone preamplifier mounted directly on the analyzer, at sound incidence angles within  $\pm\theta^\circ$  from the reference direction. Corresponds to Table A.27

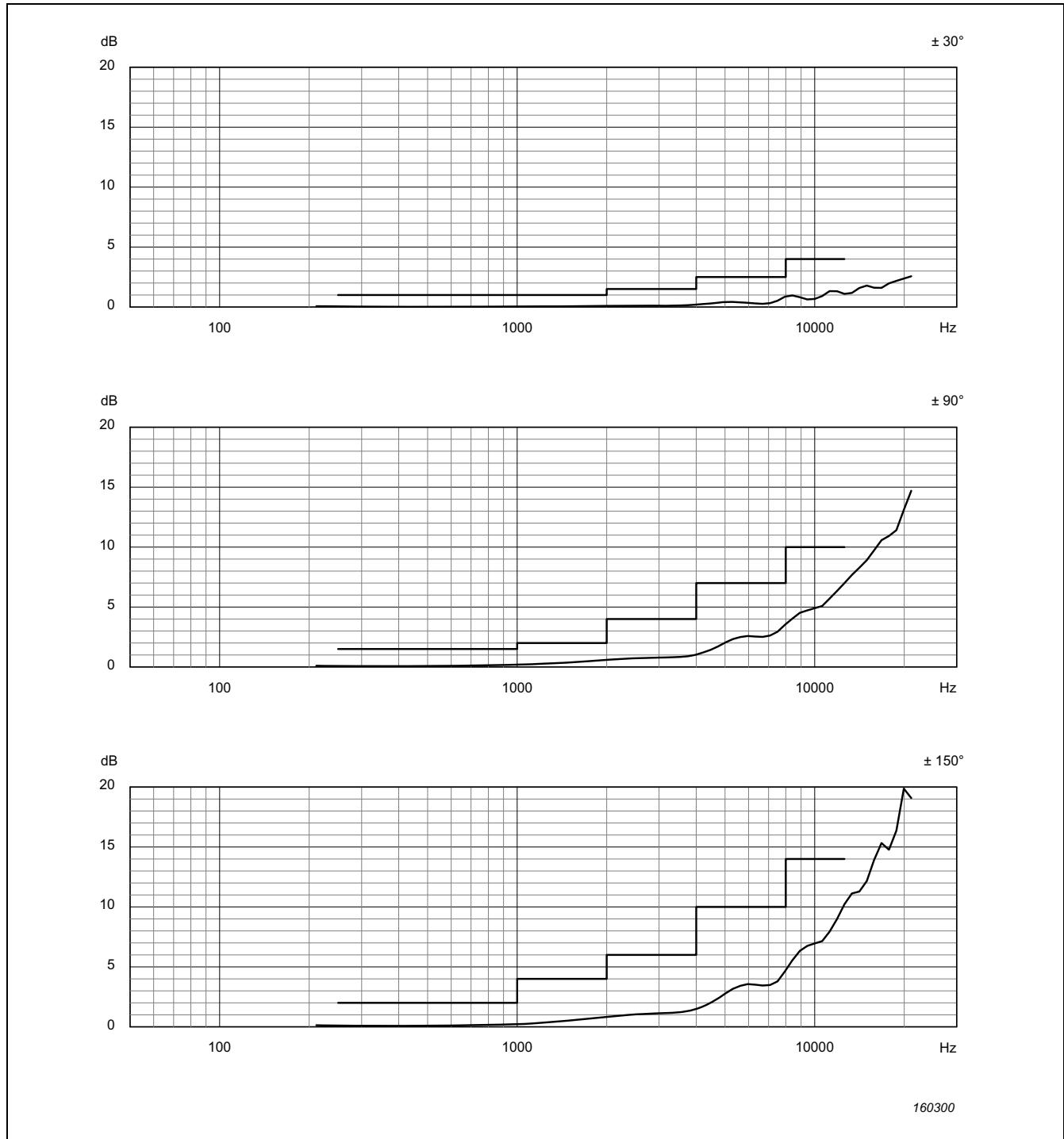


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**Fig. 4.17** Directional response for Windscreen UA-1650, Microphone Type 4966 and Microphone Preamplifier ZC-0032 with the microphone preamplifier connected to a microphone extension cable. Corresponds to Table A.31 to Table A.33

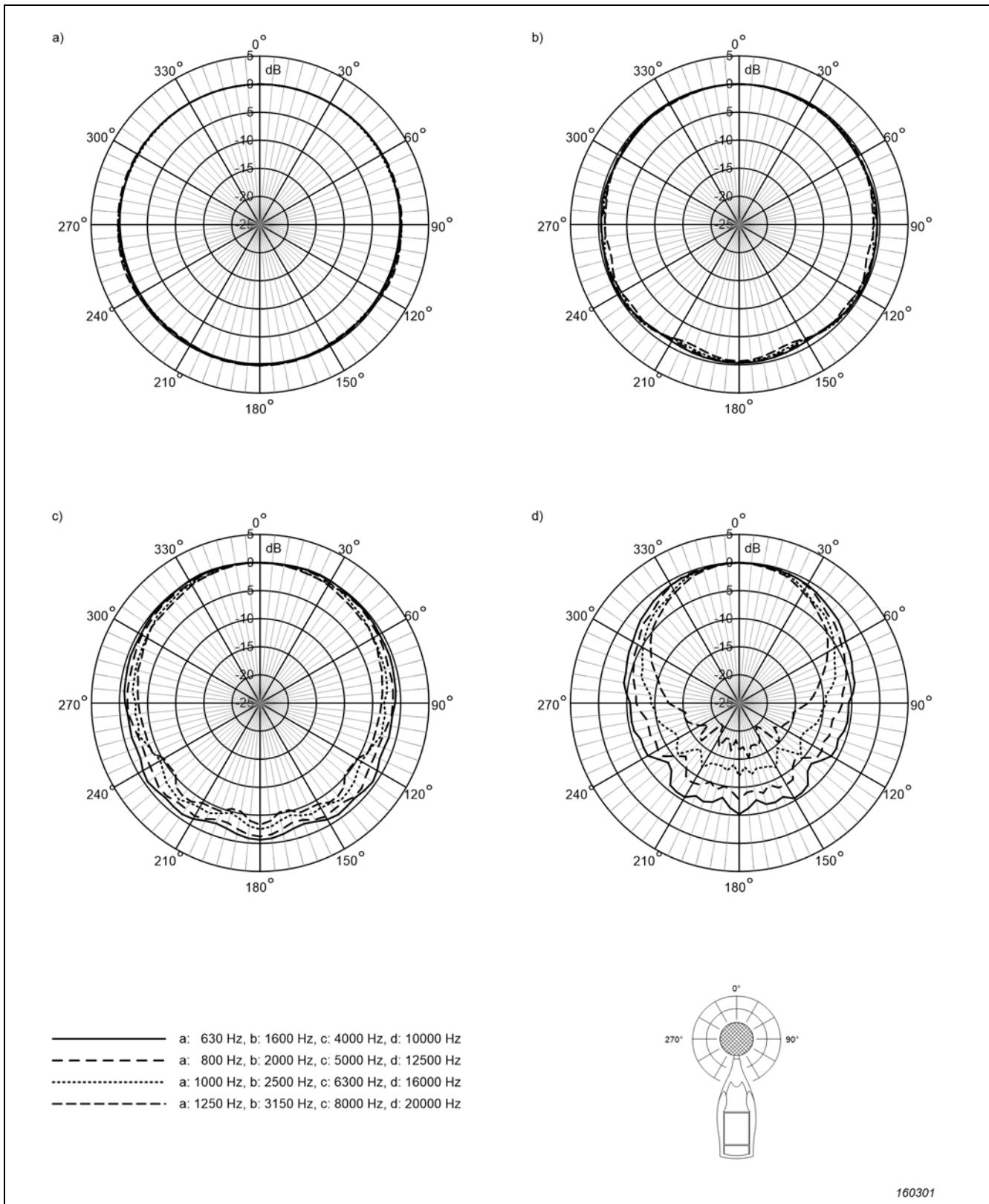


**Fig. 4.18** Sensitivity variations for Windscreen UA-1650, Microphone Type 4966 and Microphone Preamplifier ZC-0032 with the microphone preamplifier connected to a microphone extension cable, at sound incidence angles within  $\pm\theta^\circ$  from the reference direction. Corresponds to Table A.34

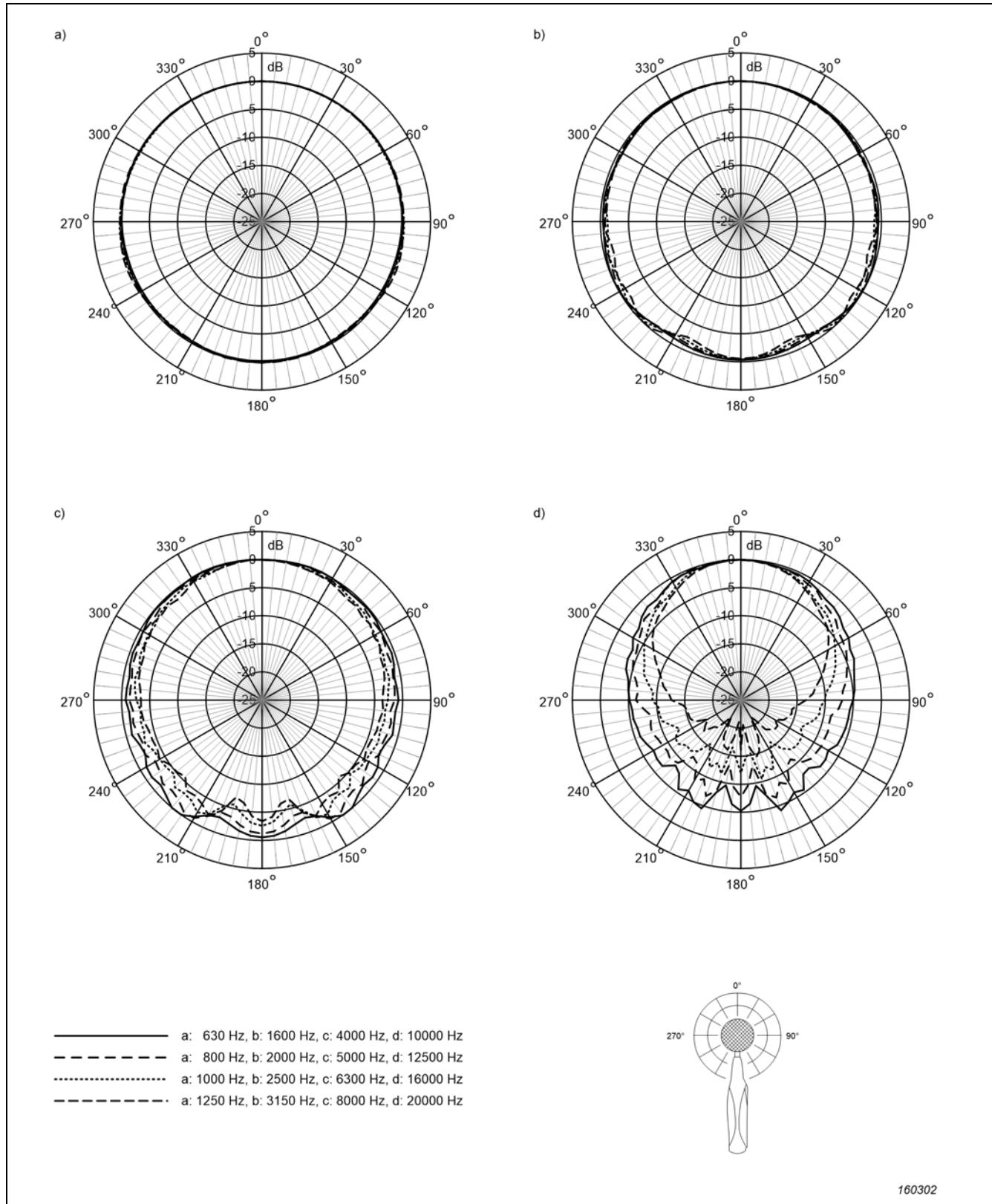


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**Fig. 4.19** Directional response for Windscreen UA-1650, Microphone Type 4966, Microphone Preamplifier ZC-0032 and the analyzer with the microphone preamplifier mounted directly on the analyzer, measured in a plane parallel to the display and along the microphone axis. Corresponds to Table A.35 to Table A.37

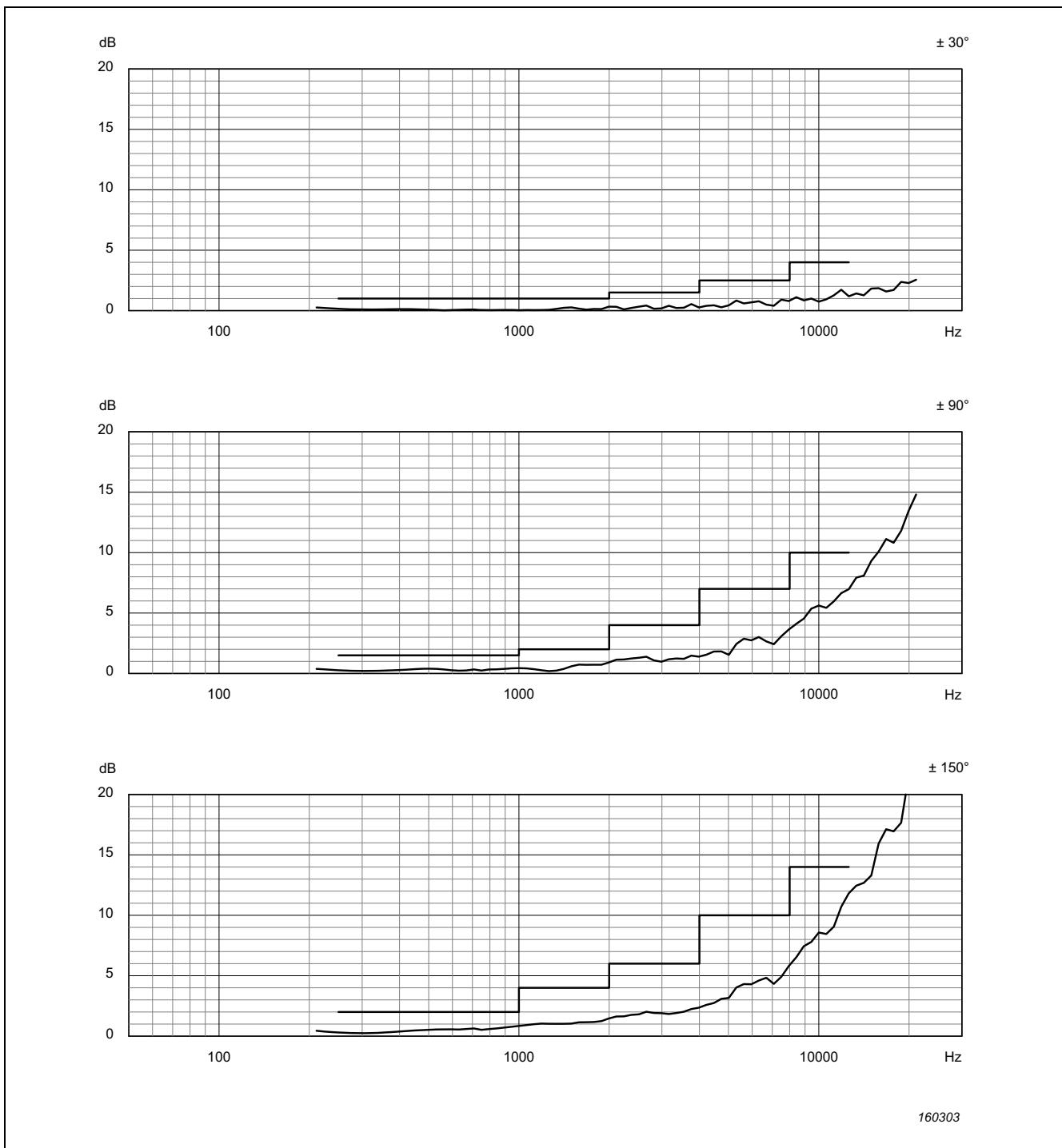


**Fig. 4.20** Directional response for Windscreen UA-1650, Microphone Type 4966, Microphone Preamplifier ZC-0032 and the analyzer with the microphone preamplifier mounted directly on the analyzer, measured in a plane perpendicular to the display and along the microphone axis. Corresponds to Table A.38 to Table A.40



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**Fig. 4.21** Sensitivity variations of Windscreen UA-1650, Microphone Type 4966, Microphone Preamplifier ZC-0032 and the analyzer with the microphone preamplifier mounted directly on the analyzer, at sound incidence angles within  $\pm\theta^\circ$  from the reference direction. Corresponds to Table A.41



**Fig. 4.22** Microphone Type 4966 is not specified together with Outdoor Microphone Kit UA-1404

**Fig. 4.23** Microphone Type 4966 is not specified together with Outdoor Microphone Kit UA-1404

## 4.8 Self-generated Noise

Self-generated noise is given for nominal microphone Open Circuit Sensitivity, with *Sound Field Correction* set to *Free-field* and no microphone accessories selected.

### 4.8.1 Maximum Broadband Self-generated Noise

**Table 4.1**  
*Maximum broadband self-generated noise*

<b>Maximum Noise</b>	<b>Frequency Weighting</b>				
	<b>A-weighting (dB)</b>	<b>B-weighting (dB)</b>	<b>C-weighting (dB)</b>	<b>Z-weighting<sup>*</sup> Normal (dB)</b>	<b>Z-weighting<sup>*</sup> Extended (dB)</b>
<b>Single-range</b>					
Microphone	15.8	14.7	14.7	16.4	16.4
Electrical	13.6	12.9	14.3	19.4	30.1
Total	17.8	16.9	17.5	21.2	30.3
<b>High Range</b>					
Microphone	15.8	14.7	14.7	16.4	16.4
Electrical	31.8	30.5	30.5	34.7	35.9
Total	31.9	30.6	30.6	34.8	35.9
<b>Low Range</b>					
Microphone	15.8	14.7	14.7	16.4	16.4
Electrical	13.6	12.9	14.3	19.4	30.1
Total	17.8	16.9	17.5	21.2	30.3

\* minimum 120 seconds L<sub>Zeq</sub>

#### 4.8.2 Typical Broadband Self-generated Noise

**Table 4.2**  
*Typical broadband self-generated noise*

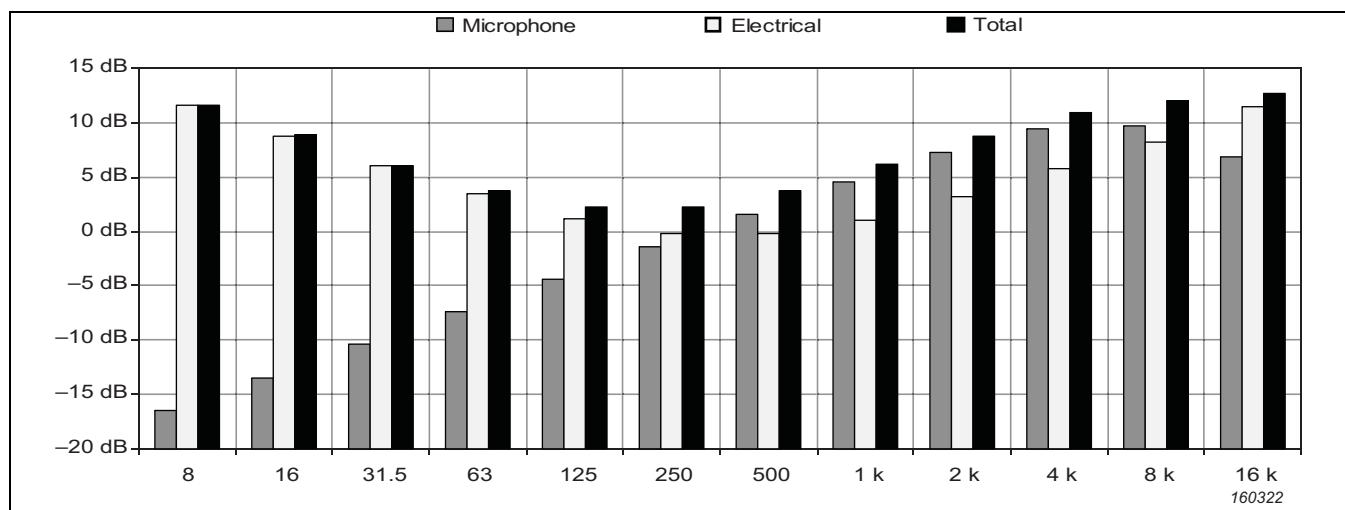
<b>Typical Noise</b>	<b>Frequency Weighting</b>				
	<b>A-weighting (dB)</b>	<b>B-weighting (dB)</b>	<b>C-weighting (dB)</b>	<b>Z- weighting* Normal (dB)</b>	<b>Z-weighting* Extended (dB)</b>
<b>Single-range</b>					
Microphone	14.8	13.7	13.7	15.4	15.4
Electrical	12.4	11.5	12.9	18.3	25.5
Total	16.8	15.7	16.3	20.1	25.9
<b>High Range</b>					
Microphone	14.8	13.7	13.7	15.4	15.4
Electrical	28.3	26.9	26.9	31.3	32.1
Total	28.5	27.1	27.1	31.4	32.2
<b>Low Range</b>					
Microphone	14.8	13.7	13.7	15.4	15.4
Electrical	12.4	11.5	12.9	18.3	25.5
Total	16.8	15.7	16.3	20.1	25.9

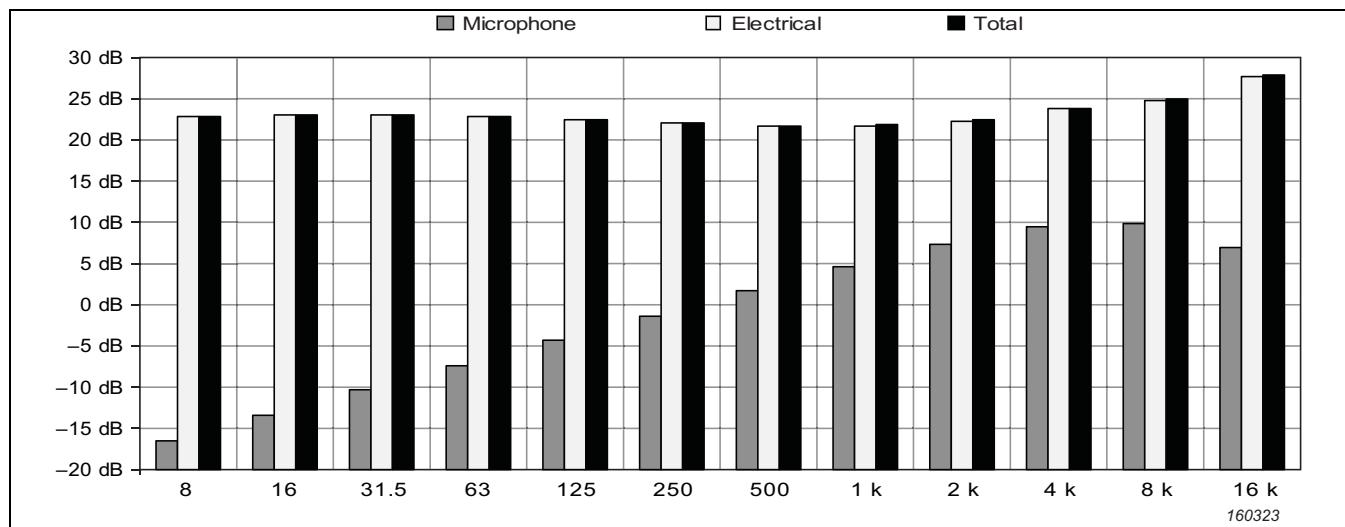
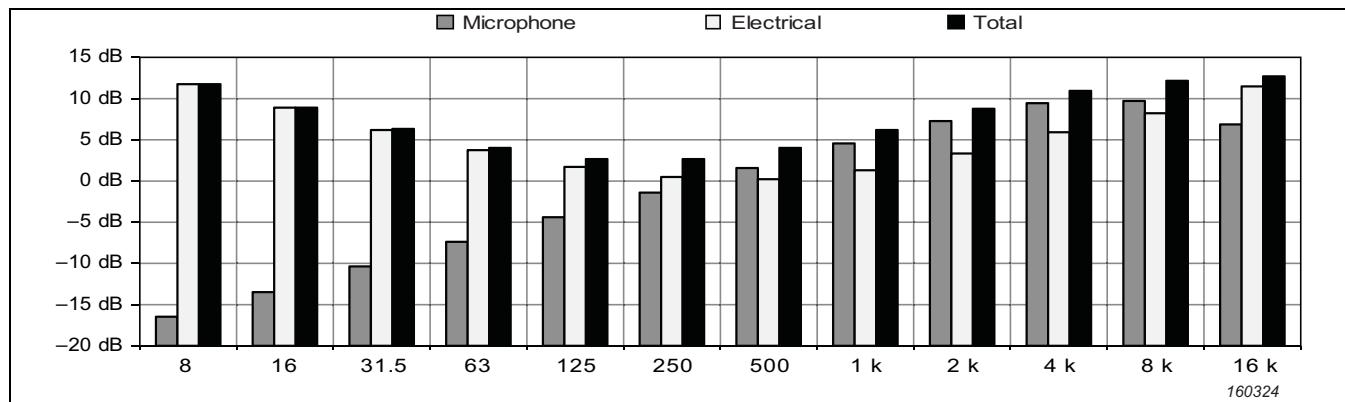
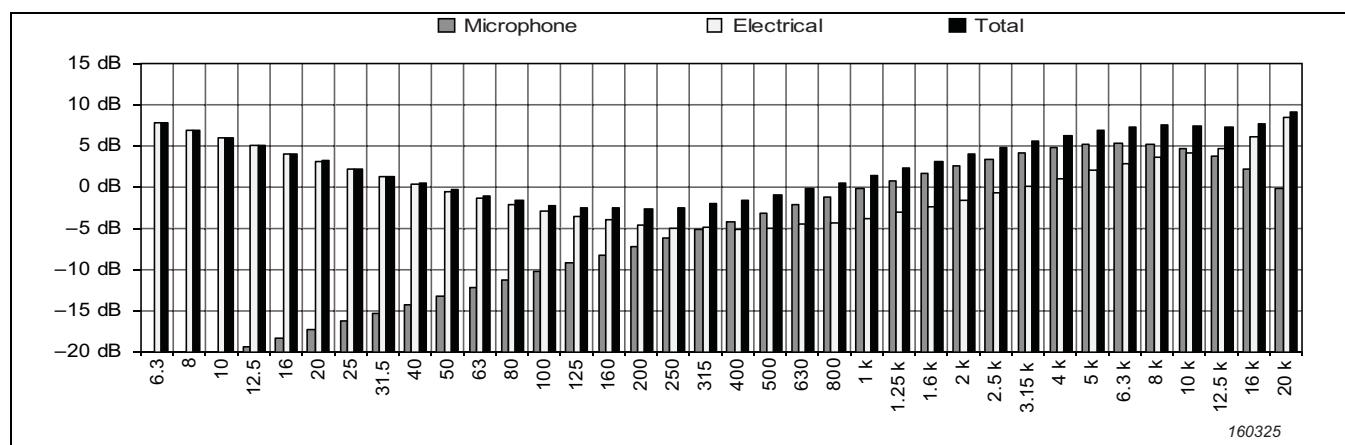
\* minimum 120 seconds  $L_{Zeq}$

#### 4.8.3 Typical Self-generated Noise Spectra

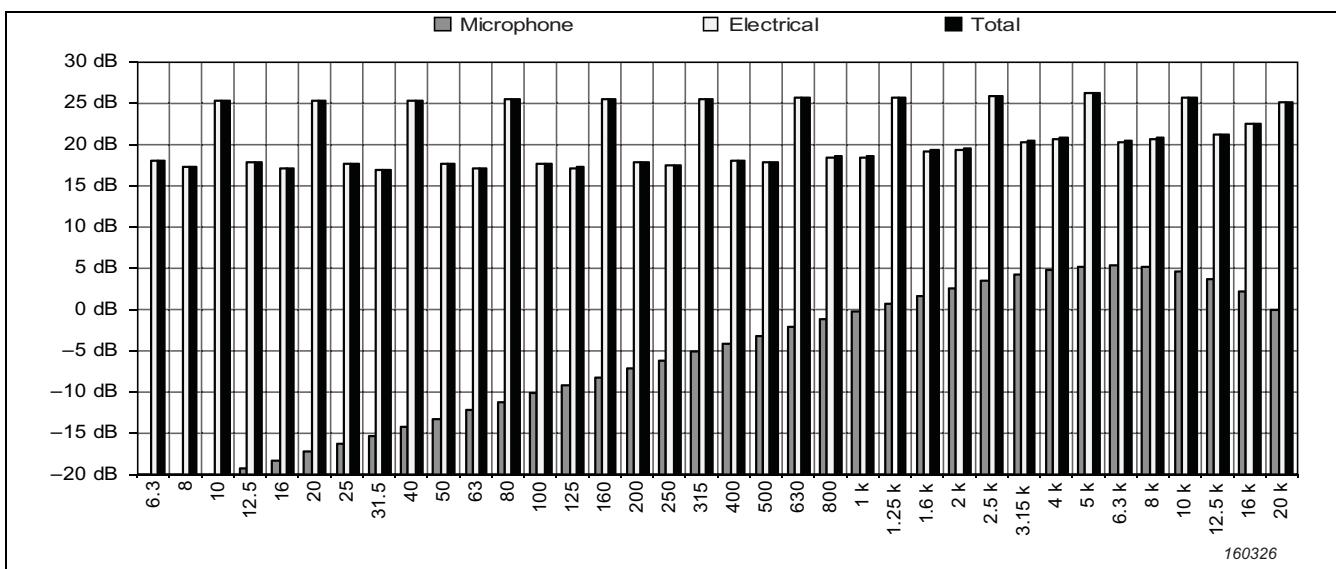
Typical spectra for self-generated noise are shown in Fig.4.24 to Fig.4.29.

**Fig. 4.24** *Typical self-generated noise, 1/1-octave band, Single-range*

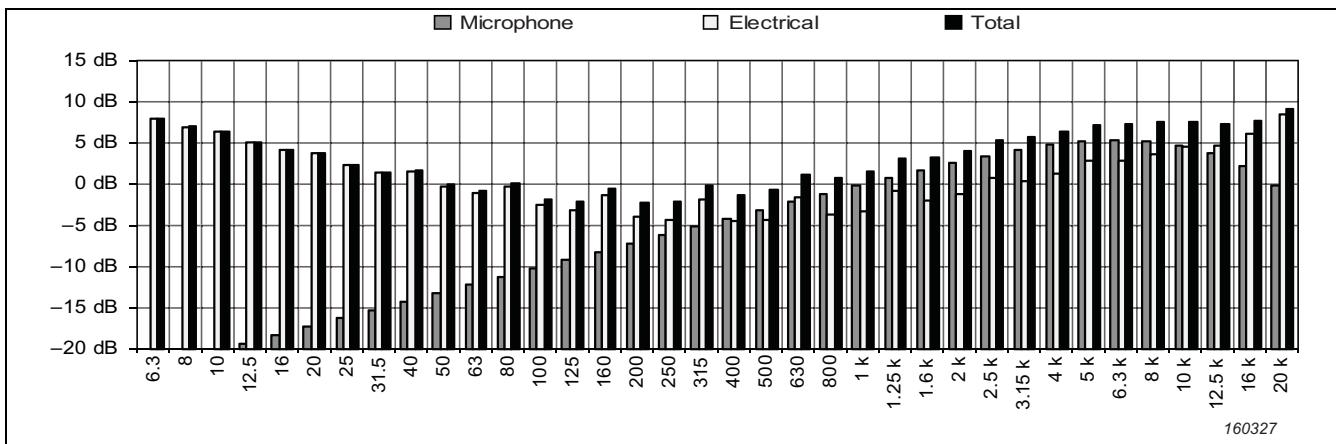


**Fig. 4.25** Typical self-generated noise, 1/1-octave band, High Range**Fig. 4.26** Typical self-generated noise, 1/1 octave band, Low Range**Fig. 4.27** Typical self-generated noise, 1/3 octave band, Single-range

**Fig. 4.28** Typical self-generated noise, 1/3-octave band, High Range



**Fig. 4.29** Typical self-generated noise, 1/3 octave band, Low Range



## 4.9 Measuring Ranges

The Upper Limit in the following sections is based on the guaranteed worst-case limit for the analyzer and the nominal Open Circuit Sensitivity of the microphone. The Overload Limit can, due to tolerances in the analyzer, be up to 1.5 dB higher than the worst-case limit, but tolerances specified in the International Standards are maintained as long as no Overload is indicated.

The Lower Limit in the following sections is based on the guaranteed worst-case limit for the analyzer, the nominal open circuit sensitivity of the microphone, under Reference Environmental Conditions, **Sound Field Correction** set to *Free-field* and no microphone accessories selected.

### 4.9.1 Maximum Sound Level

The maximum Sound Level that the Sound Level Meter can accommodate without causing damage to the Sound Level Meter: 158 dB Peak.

#### 4.9.2 Total Range

Total Range is defined as the difference between the Upper Limit on the least sensitive level range, and the lowest sound pressure level measurable on the most sensitive level range, which can be measured at 1 kHz within the most conservative tolerance limits, specified in the International Standards IEC 61672-1, IEC 60651 and IEC 60804:

**Table 4.3**  
*Total Range*

Frequency Weighting				
A-weighting (dB)	B-weighting (dB)	C-weighting (dB)	Z-weighting Normal (dB)	Z-weighting Extended (dB)
139.7– 24.8	139.7– 24.1	139.7– 25.5	139.7– 30.6	139.7– 41.3



**Please note:** For Sound Exposure Levels, the stated ranges are valid if  $10 \cdot \lg(\Delta t)$  is added to the limits.  $\Delta t$  being the averaging time interval, indicated as *Elapsed Time*, expressed in seconds.

#### 4.9.3 Primary Indicator Range

Primary Indicator Range according to the International Standard IEC 60651:

**Table 4.4**  
*Primary Indicator Range*

Range	Upper Limit (dB)	Lower Limit				
		A-weighting (dB)	B-weighting (dB)	C-weighting (dB)	Z-weighting Normal (dB)	Z-weighting Extended (dB)
<b>Single</b>	122.4	23.5	22.8	24.2	29.3	40.0
<b>High</b>	122.4	41.7	40.4	40.4	44.6	45.8
<b>Low</b>	92.4	23.5	22.8	24.2	29.3	40.0

#### 4.9.4 Indicator Range

Indicator Range according to the International Standard IEC 60804:

**Table 4.5**  
*Indicator Range*

Range	Upper Limit (dB)	Lower Limit				
		A-weighting (dB)	B-weighting (dB)	C-weighting (dB)	Z-weighting Normal (dB)	Z-weighting Extended (dB)
<b>Single</b>	139.4	23.5	22.8	24.2	29.3	40.0
<b>High</b>	139.4	41.7	40.4	40.4	44.6	45.8
<b>Low</b>	109.4	23.5	22.8	24.2	29.3	40.0



**Please note:** For Sound Exposure Levels, the stated ranges are valid if  $10 \cdot \lg(\Delta t)$  is added to the limits.  $\Delta t$  being the averaging time interval, indicated as *Elapsed Time*, expressed in seconds.

#### 4.9.5 Linearity Range

Linearity Range according to the International Standard IEC 60804 is the difference between the Upper and Lower Limit in the following table:

**Table 4.6**  
*Linearity Range*

<b>Range</b>	<b>Upper Limit (dB)</b>	<b>Lower Limit</b>				
		<b>A-weighting (dB)</b>	<b>B-weighting (dB)</b>	<b>C-weighting (dB)</b>	<b>Z-weighting Normal (dB)</b>	<b>Z-weighting Extended (dB)</b>
<b>Single</b>	140.8	21.4	20.7	22.1	27.2	37.9
<b>High</b>	140.8	39.6	38.3	38.3	42.5	43.7
<b>Low</b>	110.8	21.4	20.7	22.1	27.2	37.9

 **Please note:**

For Sound Exposure Levels, the stated ranges are valid if  $10 \cdot \lg(\Delta t)$  is added to the limits.  $\Delta t$  being the averaging time interval, indicated as *Elapsed Time*, expressed in seconds.

#### 4.9.6 Pulse Range

Pulse Range according to the International Standard IEC 60804 is the difference between the Upper and Lower Limit in the following table:

**Table 4.7**  
*Pulse Range*

<b>Range</b>	<b>Upper Limit (dB)</b>	<b>Lower Limit</b>				
		<b>A-weighting (dB)</b>	<b>B-weighting (dB)</b>	<b>C-weighting (dB)</b>	<b>Z-weighting Normal (dB)</b>	<b>Z-weighting Extended (dB)</b>
<b>Single</b>	143.8	21.4	20.7	22.1	27.2	37.9
<b>High</b>	143.8	39.6	38.3	38.3	42.5	43.7
<b>Low</b>	113.8	21.4	20.7	22.1	27.2	37.9

 **Please note:**

For Sound Exposure Levels, the stated ranges are valid if  $10 \cdot \lg(\Delta t)$  is added to the limits.  $\Delta t$  being the averaging time interval, indicated as *Elapsed Time*, expressed in seconds.

#### 4.9.7 Linear Operating Range

The starting point for all the Linear Operating Range tests is 94.0 dB.

Linear Operating Range according to the International Standard IEC 61672-1:

**Table 4.8**  
Linear  
Operating Range

<b>Frequency Weighting</b>	<b>Upper Limit</b>					<b>Lower Limit</b>
	<b>31.5 Hz (dB)</b>	<b>1 kHz (dB)</b>	<b>4 kHz (dB)</b>	<b>8 kHz (dB)</b>	<b>12.5 kHz (dB)</b>	
<b>Single range</b>						
A-weighting	100.6	139.7	140.8	138.8	134.7	24.8
B-weighting	122.9	139.7	139.1	137.0	132.9	24.1
C-weighting	137.0	139.7	139.0	136.9	132.8	25.5
Z-weighting Normal	140.0	139.7	139.9	139.9	139.0	30.6
Z-weighting Extended	140.0	139.7	139.9	139.9	139.0	41.3
<b>High Range</b>						
A-weighting	100.6	139.7	140.8	138.8	134.7	43.0
B-weighting	122.9	139.7	139.1	137.0	132.9	41.7
C-weighting	137.0	139.7	139.0	136.9	132.8	41.7
Z-weighting Normal	140.0	139.7	139.9	139.9	139.0	45.9
Z-weighting Extended	140.0	139.7	139.9	139.9	139.0	47.1
<b>Low Range</b>						
A-weighting	70.6	109.7	110.8	108.8	104.7	24.8
B-weighting	92.9	109.7	109.1	107.0	102.9	24.1
C-weighting	107.0	109.7	109.0	106.9	102.8	25.5
Z-weighting Normal	110.0	109.7	109.9	109.9	109.0	30.6
Z-weighting Extended	110.0	109.7	109.9	109.9	109.0	41.3



**Please note:** For Sound Exposure Levels, the stated ranges are valid if  $10 \cdot \lg(\Delta t)$  is added to the limits.  $\Delta t$  being the averaging time interval, indicated as *Elapsed Time*, expressed in seconds.

#### 4.9.8 Peak C Range

Peak C Range according to the International Standard IEC 61672-1 is:

**Table 4.9**  
Peak C Range

<b>Range</b>	<b>Upper Limit</b>					<b>Lower Limit</b>
	<b>31.5 Hz (dB)</b>	<b>1 kHz (dB)</b>	<b>4 kHz (dB)</b>	<b>8 kHz (dB)</b>	<b>12.5 kHz (dB)</b>	
<b>Single</b>	140.0	142.7	142.0	139.9	135.8	42.3
<b>High</b>	140.0	142.7	142.0	139.9	135.8	58.5
<b>Low</b>	110.0	112.7	112.0	109.9	105.8	42.3

## 4.11 Spectrum Analysis

### 4.11.3 Linear Operating Range

Linear Operating Range according to the International Standard IEC 61260, for electrical input, for all filters in the filter banks:

**Table 4.11**  
*Linear Operating Range*

Range	Upper Limit (dB)	Lower Limit 1/1-octave (dB)	Lower Limit 1/3-octave (dB)
<b>Single</b>	140.0	24.4	20.5
<b>High</b>	140.0	43.0	39.3
<b>Low</b>	110.0	24.5	20.6

Below the Lower Limit, the Level Linearity Error is less than or equal to the error found in Fig.2.1 with  $L_{inh}$  set to the Lower Limit – 11.5 dB.

### 4.11.4 Measurement Range

Measurement Range according to the International Standard IEC 61260 is the difference between the Upper Limit of the Linear Operating Range on the least sensitive level range and the Lower Limit of the Linear Operating Range on the most sensitive level range.

**Table 4.12**  
*Measurement Range*

1/1-octave (dB)	1/3-octave (dB)
140.0 – 24.5	140.0 – 20.6

# Appendix A

## Tables

### A.2 Free-field Frequency Responses

Frequency responses with Z frequency weighting. Measured with plane progressive sinusoidal sound waves incident from the reference direction and the analyzers's **Sound Field Correction** parameter set to *Free-field*, see section 4.6.

**Table A.2** Free-field 0° frequency response for Microphone Type 4966, Microphone Preamplifier ZC-0032 and the analyzer's electrical response with the microphone preamplifier connected to a microphone extension cable

Nominal Frequency	Exact Frequency (6 digits)	Microphone Actuator Response dB	Microphone Free-field Correction dB	Microphone Free-field Response dB	Electrical Response dB	Acoustical Response dB	Expanded Uncertainty dB
<b>63 Hz</b>	63.0957 Hz	0.05	-0.03	0.03	0.00	0.03	0.05
<b>80 Hz</b>	79.4328 Hz	0.04	-0.02	0.02	0.00	0.02	0.05
<b>100 Hz</b>	100 Hz	0.03	-0.01	0.02	0.00	0.02	0.05
<b>125 Hz</b>	125.893 Hz	0.02	-0.01	0.01	0.00	0.01	0.05
<b>160 Hz</b>	158.489 Hz	0.01	0.00	0.01	0.00	0.01	0.05
<b>200 Hz</b>	199.526 Hz	0.00	0.00	0.00	0.00	0.00	0.05
<b>250 Hz</b>	251.189 Hz	0.00	0.00	0.00	0.00	0.00	0.05
<b>315 Hz</b>	316.228 Hz	-0.01	0.00	-0.01	0.00	-0.01	0.05
<b>400 Hz</b>	398.107 Hz	-0.01	0.01	0.00	0.00	0.00	0.06
<b>500 Hz</b>	501.187 Hz	-0.02	0.02	0.00	0.00	0.00	0.06
<b>630 Hz</b>	630.957 Hz	-0.04	0.03	-0.01	0.01	0.00	0.07
<b>800 Hz</b>	794.328 Hz	-0.06	0.05	-0.01	0.01	0.00	0.08
<b>1000 Hz</b>	1000 Hz	-0.10	0.08	-0.02	0.01	-0.01	0.08
1060 Hz	1059.25 Hz	-0.11	0.09	-0.02	0.01	-0.01	0.08
1120 Hz	1122.02 Hz	-0.13	0.09	-0.04	0.01	-0.03	0.09
1180 Hz	1188.5 Hz	-0.14	0.10	-0.04	0.01	-0.03	0.09
<b>1250 Hz</b>	1258.93 Hz	-0.16	0.11	-0.05	0.02	-0.03	0.09
1320 Hz	1333.52 Hz	-0.18	0.12	-0.06	0.02	-0.04	0.09
1400 Hz	1412.54 Hz	-0.19	0.14	-0.05	0.02	-0.03	0.09
1500 Hz	1496.24 Hz	-0.21	0.15	-0.06	0.02	-0.04	0.09
<b>1600 Hz</b>	1584.89 Hz	-0.24	0.17	-0.07	0.02	-0.05	0.10
1700 Hz	1678.8 Hz	-0.27	0.20	-0.07	0.03	-0.04	0.10
1800 Hz	1778.28 Hz	-0.30	0.22	-0.08	0.03	-0.05	0.10
1900 Hz	1883.65 Hz	-0.33	0.25	-0.08	0.03	-0.05	0.10
<b>2000 Hz</b>	1995.26 Hz	-0.36	0.29	-0.07	0.04	-0.03	0.10
2120 Hz	2113.49 Hz	-0.40	0.32	-0.08	0.04	-0.04	0.11
2240 Hz	2238.72 Hz	-0.45	0.37	-0.08	0.04	-0.04	0.11
2360 Hz	2371.37 Hz	-0.49	0.42	-0.07	0.05	-0.02	0.11
<b>2500 Hz</b>	2511.89 Hz	-0.54	0.47	-0.07	0.05	-0.02	0.11
2650 Hz	2660.73 Hz	-0.59	0.53	-0.06	0.06	0.00	0.11
2800 Hz	2818.38 Hz	-0.66	0.59	-0.07	0.06	-0.01	0.11

**Microphone Type 4966 for Hand-held Analyzer Types 2250, 2250-L and 2270 –  
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Nominal Frequency	Exact Frequency (6 digits)	Microphone Actuator Response dB	Microphone Free-field Correction dB	Microphone Free-field Response dB	Electrical Response dB	Acoustical Response dB	Expanded Uncertainty dB
3000 Hz	2985.38 Hz	-0.73	0.66	-0.07	0.07	0.00	0.12
<b>3150 Hz</b>	3162.28 Hz	-0.80	0.73	-0.07	0.07	0.00	0.12
3350 Hz	3349.65 Hz	-0.88	0.81	-0.07	0.08	0.01	0.12
3550 Hz	3548.13 Hz	-0.97	0.90	-0.07	0.08	0.01	0.12
3750 Hz	3758.37 Hz	-1.06	0.99	-0.07	0.08	0.01	0.12
<b>4000 Hz</b>	3981.07 Hz	-1.17	1.09	-0.08	0.09	0.01	0.13
4250 Hz	4216.97 Hz	-1.28	1.20	-0.08	0.09	0.01	0.13
4500 Hz	4466.84 Hz	-1.40	1.32	-0.08	0.09	0.01	0.13
4750 Hz	4731.51 Hz	-1.53	1.45	-0.08	0.09	0.01	0.14
<b>5000 Hz</b>	5011.87 Hz	-1.67	1.59	-0.08	0.08	0.00	0.14
5300 Hz	5308.84 Hz	-1.83	1.74	-0.09	0.08	-0.01	0.15
5600 Hz	5623.41 Hz	-2.00	1.93	-0.07	0.06	-0.01	0.15
6000 Hz	5956.62 Hz	-2.17	2.11	-0.06	0.05	-0.01	0.16
<b>6300 Hz</b>	6309.57 Hz	-2.35	2.31	-0.04	0.02	-0.02	0.16
6700 Hz	6683.44 Hz	-2.54	2.55	0.01	-0.01	0.00	0.16
7100 Hz	7079.46 Hz	-2.74	2.82	0.08	-0.05	0.03	0.16
7500 Hz	7498.94 Hz	-2.97	3.09	0.12	-0.11	0.01	0.16
<b>8000 Hz</b>	7943.28 Hz	-3.22	3.41	0.19	-0.17	0.02	0.16
8500 Hz	8413.95 Hz	-3.50	3.76	0.26	-0.25	0.01	0.17
9000 Hz	8912.51 Hz	-3.84	4.15	0.31	-0.34	-0.03	0.17
9500 Hz	9440.61 Hz	-4.22	4.62	0.40	-0.45	-0.05	0.21
<b>10000 Hz</b>	10000 Hz	-4.64	5.16	0.52	-0.56	-0.04	0.30
10600 Hz	10592.5 Hz	-5.10	5.78	0.68	-0.69	-0.01	0.31
11200 Hz	11220.2 Hz	-5.54	6.41	0.87	-0.81	0.06	0.32
11800 Hz	11885 Hz	-5.98	6.97	0.99	-0.92	0.07	0.34
<b>12500 Hz</b>	12589.3 Hz	-6.34	7.34	1.00	-1.00	0.00	0.35
13200 Hz	13335.2 Hz	-6.67	7.60	0.93	-1.04	-0.11	0.37
14000 Hz	14125.4 Hz	-6.99	7.86	0.87	-1.01	-0.14	0.39
15000 Hz	14962.4 Hz	-7.39	8.25	0.86	-0.89	-0.03	0.40
<b>16000 Hz</b>	15848.9 Hz	-7.83	8.67	0.84	-0.67	0.17	0.42
17000 Hz	16788 Hz	-8.33	8.83	0.50	-0.37	0.13	0.44
18000 Hz	17782.8 Hz	-8.97	8.98	0.01	-0.01	0.00	0.46
19000 Hz	18836.5 Hz	-9.78	9.43	-0.35	0.38	0.03	0.48
<b>20000 Hz</b>	19952.6 Hz	-10.71	9.93	-0.78	0.77	-0.01	0.50
21200 Hz	21134.9 Hz	-11.74	10.34	-1.40	1.09	-0.31	0.52
22400 Hz	22387.2 Hz	-12.92	11.01	-1.91	1.30	-0.61	0.54

**Table A.3** Free-field 0° frequency response for Microphone Type 4966, Microphone Preamplifier ZC-0032 and the analyzer with the microphone preamplifier mounted directly on the analyzer

Nominal Frequency	Exact Frequency (6 digits)	Acoustical Response (From Table A.2) dB	Expanded Uncertainty dB	Body Influence dB	Expanded Uncertainty dB	Acoustical Response dB	Expanded Uncertainty dB
<b>63 Hz</b>	63.0957 Hz	0.03	0.05	0.00	0.10	0.03	0.11
<b>80 Hz</b>	79.4328 Hz	0.02	0.05	0.00	0.10	0.02	0.11
<b>100 Hz</b>	100 Hz	0.02	0.05	0.00	0.10	0.02	0.11
<b>125 Hz</b>	125.893 Hz	0.01	0.05	0.00	0.10	0.01	0.11
<b>160 Hz</b>	158.489 Hz	0.01	0.05	0.01	0.10	0.02	0.11
<b>200 Hz</b>	199.526 Hz	0.00	0.05	0.03	0.10	0.03	0.11
<b>250 Hz</b>	251.189 Hz	0.00	0.05	0.07	0.10	0.06	0.11
<b>315 Hz</b>	316.228 Hz	-0.01	0.05	0.13	0.10	0.12	0.11
<b>400 Hz</b>	398.107 Hz	0.00	0.06	0.21	0.10	0.21	0.11
<b>500 Hz</b>	501.187 Hz	0.00	0.06	0.22	0.10	0.22	0.12
<b>630 Hz</b>	630.957 Hz	0.00	0.07	0.07	0.10	0.07	0.12
<b>800 Hz</b>	794.328 Hz	0.00	0.08	-0.11	0.10	-0.11	0.13
<b>1000 Hz</b>	1000 Hz	-0.01	0.08	-0.07	0.10	-0.08	0.13
1060 Hz	1059.25 Hz	-0.01	0.08	-0.10	0.10	-0.12	0.13
1120 Hz	1122.02 Hz	-0.03	0.09	-0.18	0.10	-0.20	0.13

Nominal Frequency	Exact Frequency (6 digits)	Acoustical Response (From Table A.2) dB	Expanded Uncertainty dB	Body Influence dB	Expanded Uncertainty dB	Acoustical Response dB	Expanded Uncertainty dB
1180 Hz	1188.5 Hz	-0.03	0.09	-0.26	0.10	-0.29	0.13
<b>1250 Hz</b>	1258.93 Hz	-0.03	0.09	-0.30	0.10	-0.33	0.13
1320 Hz	1333.52 Hz	-0.04	0.09	-0.24	0.10	-0.28	0.13
1400 Hz	1412.54 Hz	-0.03	0.09	-0.08	0.10	-0.11	0.13
1500 Hz	1496.24 Hz	-0.04	0.09	0.10	0.10	0.06	0.13
<b>1600 Hz</b>	1584.89 Hz	-0.05	0.10	0.17	0.10	0.12	0.14
1700 Hz	1678.8 Hz	-0.04	0.10	0.07	0.10	0.03	0.14
1800 Hz	1778.28 Hz	-0.05	0.10	-0.12	0.10	-0.17	0.14
1900 Hz	1883.65 Hz	-0.05	0.10	-0.21	0.10	-0.26	0.14
<b>2000 Hz</b>	1995.26 Hz	-0.03	0.10	-0.09	0.10	-0.12	0.14
2120 Hz	2113.49 Hz	-0.04	0.11	0.11	0.10	0.08	0.15
2240 Hz	2238.72 Hz	-0.04	0.11	0.09	0.15	0.05	0.18
2360 Hz	2371.37 Hz	-0.02	0.11	-0.30	0.15	-0.33	0.18
<b>2500 Hz</b>	2511.89 Hz	-0.02	0.11	-0.17	0.15	-0.19	0.19
2650 Hz	2660.73 Hz	0.00	0.11	0.18	0.15	0.18	0.19
2800 Hz	2818.38 Hz	-0.01	0.11	0.09	0.15	0.08	0.19
3000 Hz	2985.38 Hz	0.00	0.12	-0.12	0.15	-0.13	0.19
<b>3150 Hz</b>	3162.28 Hz	0.00	0.12	0.16	0.15	0.16	0.19
3350 Hz	3349.65 Hz	0.01	0.12	0.03	0.15	0.04	0.19
3550 Hz	3548.13 Hz	0.01	0.12	-0.13	0.15	-0.12	0.19
3750 Hz	3758.37 Hz	0.01	0.12	0.20	0.15	0.21	0.19
<b>4000 Hz</b>	3981.07 Hz	0.01	0.13	-0.09	0.15	-0.08	0.20
4250 Hz	4216.97 Hz	0.01	0.13	-0.01	0.15	0.00	0.20
4500 Hz	4466.84 Hz	0.01	0.13	0.10	0.15	0.10	0.20
4750 Hz	4731.51 Hz	0.01	0.14	-0.16	0.15	-0.16	0.20
<b>5000 Hz</b>	5011.87 Hz	0.00	0.14	-0.24	0.15	-0.24	0.21
5300 Hz	5308.84 Hz	-0.01	0.15	-0.10	0.15	-0.10	0.21
5600 Hz	5623.41 Hz	-0.01	0.15	-0.05	0.15	-0.07	0.21
6000 Hz	5956.62 Hz	-0.01	0.16	0.03	0.15	0.02	0.22
<b>6300 Hz</b>	6309.57 Hz	-0.02	0.16	0.06	0.15	0.04	0.22
6700 Hz	6683.44 Hz	0.00	0.16	0.05	0.15	0.05	0.22
7100 Hz	7079.46 Hz	0.03	0.16	-0.03	0.15	0.00	0.22
7500 Hz	7498.94 Hz	0.01	0.16	-0.08	0.20	-0.07	0.26
<b>8000 Hz</b>	7943.28 Hz	0.02	0.16	-0.08	0.20	-0.07	0.26
8500 Hz	8413.95 Hz	0.01	0.17	-0.19	0.20	-0.18	0.26
9000 Hz	8912.51 Hz	-0.03	0.17	-0.01	0.20	-0.03	0.26
9500 Hz	9440.61 Hz	-0.05	0.21	0.11	0.20	0.05	0.29
<b>10000 Hz</b>	10000 Hz	-0.04	0.30	0.15	0.20	0.11	0.36
10600 Hz	10592.5 Hz	-0.01	0.31	-0.14	0.20	-0.16	0.37
11200 Hz	11220.2 Hz	0.06	0.32	-0.13	0.20	-0.07	0.38
11800 Hz	11885 Hz	0.07	0.34	0.08	0.20	0.15	0.39
<b>12500 Hz</b>	12589.3 Hz	0.00	0.35	0.15	0.20	0.15	0.40
13200 Hz	13335.2 Hz	-0.11	0.37	0.00	0.20	-0.11	0.42
14000 Hz	14125.4 Hz	-0.14	0.39	-0.08	0.20	-0.21	0.43
15000 Hz	14962.4 Hz	-0.03	0.40	0.05	0.20	0.02	0.45
<b>16000 Hz</b>	15848.9 Hz	0.17	0.42	0.11	0.20	0.28	0.47
17000 Hz	16788 Hz	0.13	0.44	-0.01	0.20	0.12	0.48
18000 Hz	17782.8 Hz	0.00	0.46	-0.07	0.20	-0.06	0.50
19000 Hz	18836.5 Hz	0.03	0.48	0.12	0.20	0.15	0.52
<b>20000 Hz</b>	19952.6 Hz	-0.01	0.50	0.00	0.20	-0.01	0.53
21200 Hz	21134.9 Hz	-0.31	0.52	0.04	0.20	-0.27	0.55
22400 Hz	22387.2 Hz	-0.61	0.54	0.17	0.20	-0.44	0.57

**Microphone Type 4966 for Hand-held Analyzer Types 2250, 2250-L and 2270 –  
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**Table A.4** Free-field 0° frequency response for Windscreen UA-1650, Microphone Type 4966, Microphone Preamplifier ZC-0032 and the analyzer's electrical response, with the microphone preamplifier connected to a microphone extension cable

Nominal Frequency	Exact Frequency (6 digits)	Microphone Free-field Response (From Table A.2) dB	Expanded Uncertainty dB	Influence of Windscreen dB	Expanded Uncertainty dB	Electrical Response dB	Acoustical Response dB	Expanded Uncertainty dB
<b>63 Hz</b>	63.0957 Hz	0.03	0.05	0.00	0.15	0.00	0.03	0.16
<b>80 Hz</b>	79.4328 Hz	0.02	0.05	0.00	0.15	0.00	0.02	0.16
<b>100 Hz</b>	100 Hz	0.02	0.05	0.00	0.15	0.00	0.02	0.16
<b>125 Hz</b>	125.893 Hz	0.01	0.05	0.00	0.15	0.00	0.01	0.16
<b>160 Hz</b>	158.489 Hz	0.01	0.05	0.00	0.15	-0.01	0.00	0.16
<b>200 Hz</b>	199.526 Hz	0.00	0.05	0.00	0.15	-0.01	-0.01	0.16
<b>250 Hz</b>	251.189 Hz	0.00	0.05	0.01	0.15	-0.02	-0.01	0.16
<b>315 Hz</b>	316.228 Hz	-0.01	0.05	0.03	0.15	-0.03	-0.01	0.16
<b>400 Hz</b>	398.107 Hz	0.00	0.06	0.05	0.15	-0.05	0.00	0.16
<b>500 Hz</b>	501.187 Hz	0.00	0.06	0.07	0.15	-0.08	-0.01	0.16
<b>630 Hz</b>	630.957 Hz	-0.01	0.07	0.10	0.15	-0.12	-0.03	0.16
<b>800 Hz</b>	794.328 Hz	-0.01	0.08	0.14	0.15	-0.19	-0.06	0.17
<b>1000 Hz</b>	1000 Hz	-0.02	0.08	0.18	0.15	-0.28	-0.12	0.17
1060 Hz	1059.25 Hz	-0.02	0.08	0.21	0.15	-0.30	-0.11	0.17
1120 Hz	1122.02 Hz	-0.04	0.09	0.25	0.15	-0.33	-0.12	0.17
1180 Hz	1188.5 Hz	-0.04	0.09	0.28	0.15	-0.36	-0.11	0.17
<b>1250 Hz</b>	1258.93 Hz	-0.05	0.09	0.32	0.15	-0.39	-0.11	0.17
1320 Hz	1333.52 Hz	-0.06	0.09	0.37	0.15	-0.42	-0.11	0.17
1400 Hz	1412.54 Hz	-0.05	0.09	0.41	0.15	-0.45	-0.09	0.17
1500 Hz	1496.24 Hz	-0.06	0.09	0.45	0.15	-0.48	-0.08	0.17
<b>1600 Hz</b>	1584.89 Hz	-0.07	0.10	0.50	0.15	-0.51	-0.08	0.18
1700 Hz	1678.8 Hz	-0.07	0.10	0.55	0.15	-0.54	-0.07	0.18
1800 Hz	1778.28 Hz	-0.08	0.10	0.59	0.15	-0.56	-0.05	0.18
1900 Hz	1883.65 Hz	-0.08	0.10	0.63	0.15	-0.58	-0.02	0.18
<b>2000 Hz</b>	1995.26 Hz	-0.07	0.10	0.67	0.20	-0.59	0.01	0.22
2120 Hz	2113.49 Hz	-0.08	0.11	0.70	0.20	-0.59	0.03	0.23
2240 Hz	2238.72 Hz	-0.08	0.11	0.71	0.20	-0.58	0.05	0.23
2360 Hz	2371.37 Hz	-0.07	0.11	0.72	0.20	-0.57	0.08	0.23
<b>2500 Hz</b>	2511.89 Hz	-0.07	0.11	0.72	0.20	-0.55	0.10	0.23
2650 Hz	2660.73 Hz	-0.06	0.11	0.70	0.20	-0.52	0.12	0.23
2800 Hz	2818.38 Hz	-0.07	0.11	0.68	0.20	-0.48	0.13	0.23
3000 Hz	2985.38 Hz	-0.07	0.12	0.63	0.20	-0.43	0.13	0.23
<b>3150 Hz</b>	3162.28 Hz	-0.07	0.12	0.55	0.20	-0.38	0.10	0.23
3350 Hz	3349.65 Hz	-0.07	0.12	0.44	0.20	-0.32	0.05	0.23
3550 Hz	3548.13 Hz	-0.07	0.12	0.30	0.20	-0.26	-0.03	0.23
3750 Hz	3758.37 Hz	-0.07	0.12	0.16	0.20	-0.21	-0.12	0.23
<b>4000 Hz</b>	3981.07 Hz	-0.08	0.13	0.05	0.20	-0.15	-0.18	0.24
4250 Hz	4216.97 Hz	-0.08	0.13	-0.05	0.20	-0.09	-0.22	0.24
4500 Hz	4466.84 Hz	-0.08	0.13	-0.13	0.20	-0.05	-0.26	0.24
4750 Hz	4731.51 Hz	-0.08	0.14	-0.18	0.20	0.00	-0.26	0.24
<b>5000 Hz</b>	5011.87 Hz	-0.08	0.14	-0.19	0.20	0.03	-0.24	0.24
5300 Hz	5308.84 Hz	-0.09	0.15	-0.17	0.25	0.06	-0.20	0.29
5600 Hz	5623.41 Hz	-0.07	0.15	-0.16	0.25	0.08	-0.15	0.29
6000 Hz	5956.62 Hz	-0.06	0.16	-0.13	0.25	0.09	-0.10	0.29
<b>6300 Hz</b>	6309.57 Hz	-0.04	0.16	-0.11	0.25	0.09	-0.06	0.29
6700 Hz	6683.44 Hz	0.01	0.16	-0.16	0.25	0.08	-0.07	0.30
7100 Hz	7079.46 Hz	0.08	0.16	-0.28	0.25	0.07	-0.13	0.30
7500 Hz	7498.94 Hz	0.12	0.16	-0.36	0.25	0.04	-0.20	0.30
<b>8000 Hz</b>	7943.28 Hz	0.19	0.16	-0.41	0.25	0.00	-0.22	0.30
8500 Hz	8413.95 Hz	0.26	0.17	-0.47	0.25	-0.04	-0.25	0.30
9000 Hz	8912.51 Hz	0.31	0.17	-0.45	0.25	-0.10	-0.23	0.30
9500 Hz	9440.61 Hz	0.40	0.21	-0.47	0.25	-0.16	-0.23	0.33
<b>10000 Hz</b>	10000 Hz	0.52	0.30	-0.52	0.25	-0.22	-0.22	0.39
10600 Hz	10592.5 Hz	0.68	0.31	-0.63	0.25	-0.28	-0.23	0.40
11200 Hz	11220.2 Hz	0.87	0.32	-0.74	0.25	-0.34	-0.21	0.41

Nominal Frequency	Exact Frequency (6 digits)	Microphone Free-field Response (From Table A.2) dB	Expanded Uncertainty dB	Influence of Windscreen dB	Expanded Uncertainty dB	Electrical Response dB	Acoustical Response dB	Expanded Uncertainty dB
11800 Hz	11885 Hz	0.99	0.34	-0.86	0.25	-0.38	-0.25	0.42
<b>12500 Hz</b>	12589.3 Hz	1.00	0.35	-0.88	0.25	-0.39	-0.27	0.43
13200 Hz	13335.2 Hz	0.93	0.37	-0.99	0.25	-0.36	-0.43	0.44
14000 Hz	14125.4 Hz	0.87	0.39	-1.13	0.25	-0.27	-0.53	0.46
15000 Hz	14962.4 Hz	0.86	0.40	-1.20	0.30	-0.10	-0.44	0.50
<b>16000 Hz</b>	15848.9 Hz	0.84	0.42	-1.33	0.30	0.16	-0.33	0.52
17000 Hz	16788 Hz	0.50	0.44	-1.50	0.30	0.53	-0.47	0.53
18000 Hz	17782.8 Hz	0.01	0.46	-1.61	0.30	0.99	-0.61	0.55
19000 Hz	18836.5 Hz	-0.35	0.48	-1.64	0.30	1.50	-0.49	0.56
<b>20000 Hz</b>	19952.6 Hz	-0.78	0.50	-1.73	0.30	2.03	-0.48	0.58
21200 Hz	21134.9 Hz	-1.40	0.52	-1.81	0.30	2.50	-0.71	0.60
22400 Hz	22387.2 Hz	-1.91	0.54	-1.79	0.30	2.83	-0.87	0.61

**Table A.5** Free-field 0° frequency response for Windscreen UA-1650, Microphone Type 4966, Microphone Preamplifier ZC-0032 and the analyzer with the microphone preamplifier mounted directly on the analyzer

Nominal Frequency	Exact Frequency (6 digits)	Acoustical Response (From Table A.4) dB	Expanded Uncertainty dB	Body Influence dB	Expanded Uncertainty dB	Acoustical Response dB	Expanded Uncertainty dB
<b>63 Hz</b>	63.0957 Hz	0.03	0.16	0.00	0.10	0.03	0.19
<b>80 Hz</b>	79.4328 Hz	0.02	0.16	0.00	0.10	0.02	0.19
<b>100 Hz</b>	100 Hz	0.02	0.16	0.00	0.10	0.02	0.19
<b>125 Hz</b>	125.893 Hz	0.01	0.16	0.00	0.10	0.01	0.19
<b>160 Hz</b>	158.489 Hz	0.00	0.16	0.01	0.10	0.01	0.19
<b>200 Hz</b>	199.526 Hz	-0.01	0.16	0.03	0.10	0.02	0.19
<b>250 Hz</b>	251.189 Hz	-0.01	0.16	0.07	0.10	0.06	0.19
<b>315 Hz</b>	316.228 Hz	-0.01	0.16	0.13	0.10	0.12	0.19
<b>400 Hz</b>	398.107 Hz	0.00	0.16	0.21	0.10	0.20	0.19
<b>500 Hz</b>	501.187 Hz	-0.01	0.16	0.22	0.10	0.21	0.19
<b>630 Hz</b>	630.957 Hz	-0.03	0.16	0.07	0.10	0.04	0.19
<b>800 Hz</b>	794.328 Hz	-0.06	0.17	-0.11	0.10	-0.17	0.20
<b>1000 Hz</b>	1000 Hz	-0.12	0.17	-0.07	0.10	-0.19	0.20
1060 Hz	1059.25 Hz	-0.11	0.17	-0.10	0.10	-0.21	0.20
1120 Hz	1122.02 Hz	-0.12	0.17	-0.18	0.10	-0.29	0.20
<b>1180 Hz</b>	1188.5 Hz	-0.11	0.17	-0.26	0.10	-0.37	0.20
<b>1250 Hz</b>	1258.93 Hz	-0.11	0.17	-0.30	0.10	-0.42	0.20
1320 Hz	1333.52 Hz	-0.11	0.17	-0.24	0.10	-0.35	0.20
1400 Hz	1412.54 Hz	-0.09	0.17	-0.08	0.10	-0.17	0.20
<b>1500 Hz</b>	1496.24 Hz	-0.08	0.17	0.10	0.10	0.01	0.20
<b>1600 Hz</b>	1584.89 Hz	-0.08	0.18	0.17	0.10	0.09	0.21
1700 Hz	1678.8 Hz	-0.07	0.18	0.07	0.10	0.00	0.21
1800 Hz	1778.28 Hz	-0.05	0.18	-0.12	0.10	-0.17	0.21
<b>1900 Hz</b>	1883.65 Hz	-0.02	0.18	-0.21	0.10	-0.24	0.21
<b>2000 Hz</b>	1995.26 Hz	0.01	0.22	-0.09	0.10	-0.08	0.24
2120 Hz	2113.49 Hz	0.03	0.23	0.11	0.10	0.15	0.25
2240 Hz	2238.72 Hz	0.05	0.23	0.09	0.15	0.14	0.27
<b>2360 Hz</b>	2371.37 Hz	0.08	0.23	-0.30	0.15	-0.22	0.27
<b>2500 Hz</b>	2511.89 Hz	0.10	0.23	-0.17	0.15	-0.07	0.27
2650 Hz	2660.73 Hz	0.12	0.23	0.18	0.15	0.30	0.27
2800 Hz	2818.38 Hz	0.13	0.23	0.09	0.15	0.22	0.27
<b>3000 Hz</b>	2985.38 Hz	0.13	0.23	-0.12	0.15	0.00	0.27
<b>3150 Hz</b>	3162.28 Hz	0.10	0.23	0.16	0.15	0.26	0.27
3350 Hz	3349.65 Hz	0.05	0.23	0.03	0.15	0.08	0.27
3550 Hz	3548.13 Hz	-0.03	0.23	-0.13	0.15	-0.16	0.27
<b>3750 Hz</b>	3758.37 Hz	-0.12	0.23	0.20	0.15	0.08	0.27
<b>4000 Hz</b>	3981.07 Hz	-0.18	0.24	-0.09	0.15	-0.28	0.28
4250 Hz	4216.97 Hz	-0.22	0.24	-0.01	0.15	-0.23	0.28
4500 Hz	4466.84 Hz	-0.26	0.24	0.10	0.15	-0.17	0.28

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Nominal Frequency	Exact Frequency (6 digits)	Acoustical Response (From Table A.4) dB	Expanded Uncertainty dB	Body Influence dB	Expanded Uncertainty dB	Acoustical Response dB	Expanded Uncertainty dB
4750 Hz	4731.51 Hz	-0.26	0.24	-0.16	0.15	-0.43	0.28
<b>5000 Hz</b>	5011.87 Hz	-0.24	0.24	-0.24	0.15	-0.48	0.28
5300 Hz	5308.84 Hz	-0.20	0.29	-0.10	0.15	-0.29	0.33
5600 Hz	5623.41 Hz	-0.15	0.29	-0.05	0.15	-0.20	0.33
6000 Hz	5956.62 Hz	-0.10	0.29	0.03	0.15	-0.07	0.33
<b>6300 Hz</b>	6309.57 Hz	-0.06	0.29	0.06	0.15	0.00	0.33
6700 Hz	6683.44 Hz	-0.07	0.30	0.05	0.15	-0.02	0.34
7100 Hz	7079.46 Hz	-0.13	0.30	-0.03	0.15	-0.16	0.34
7500 Hz	7498.94 Hz	-0.20	0.30	-0.08	0.20	-0.28	0.36
<b>8000 Hz</b>	7943.28 Hz	-0.22	0.30	-0.08	0.20	-0.31	0.36
8500 Hz	8413.95 Hz	-0.25	0.30	-0.19	0.20	-0.44	0.36
9000 Hz	8912.51 Hz	-0.23	0.30	-0.01	0.20	-0.24	0.36
9500 Hz	9440.61 Hz	-0.23	0.33	0.11	0.20	-0.12	0.39
<b>10000 Hz</b>	10000 Hz	-0.22	0.39	0.15	0.20	-0.07	0.44
10600 Hz	10592.5 Hz	-0.23	0.40	-0.14	0.20	-0.37	0.45
11200 Hz	11220.2 Hz	-0.21	0.41	-0.13	0.20	-0.34	0.46
11800 Hz	11885 Hz	-0.25	0.42	0.08	0.20	-0.17	0.47
<b>12500 Hz</b>	12589.3 Hz	-0.27	0.43	0.15	0.20	-0.12	0.47
13200 Hz	13335.2 Hz	-0.43	0.44	0.00	0.20	-0.43	0.48
14000 Hz	14125.4 Hz	-0.53	0.46	-0.08	0.20	-0.60	0.50
15000 Hz	14962.4 Hz	-0.44	0.50	0.05	0.20	-0.40	0.54
<b>16000 Hz</b>	15848.9 Hz	-0.33	0.52	0.11	0.20	-0.22	0.56
17000 Hz	16788 Hz	-0.47	0.53	-0.01	0.20	-0.48	0.57
18000 Hz	17782.8 Hz	-0.61	0.55	-0.07	0.20	-0.67	0.59
19000 Hz	18836.5 Hz	-0.49	0.56	0.12	0.20	-0.37	0.59
<b>20000 Hz</b>	19952.6 Hz	-0.48	0.58	0.00	0.20	-0.48	0.61
21200 Hz	21134.9 Hz	-0.71	0.60	0.04	0.20	-0.67	0.63
22400 Hz	22387.2 Hz	-0.87	0.61	0.17	0.20	-0.70	0.64

**Table A.6** Microphone Type 4966 is not specified together with Outdoor Microphone Kit UA-1404

### A.3 Diffuse-field Frequency Responses

Diffuse-field frequency responses with Z frequency weighting. Measured with sounds at random incidence and the analyzer's **Sound Field Correction** parameter set to *Diffuse-field*, see section 4.6.

**Table A.7** Diffuse-field frequency response for Microphone Type 4966, Microphone Preamplifier ZC-0032 and the analyzer with or without the microphone preamplifier connected to a microphone extension cable

Nominal Frequency	Exact Frequency (6 digits)	Microphone Actuator Response dB	Microphone Diffuse-field Correction dB	Microphone Diffuse-field Response dB	Electrical Response dB	Acoustical Response dB	Expanded Uncertainty dB
<b>63 Hz</b>	63.0957 Hz	0.05	-0.03	0.02	0.00	0.02	0.07
<b>80 Hz</b>	79.4328 Hz	0.04	-0.02	0.02	0.00	0.02	0.07
<b>100 Hz</b>	100 Hz	0.03	-0.02	0.01	0.00	0.01	0.07
<b>125 Hz</b>	125.893 Hz	0.02	-0.01	0.00	0.00	0.00	0.07
<b>160 Hz</b>	158.489 Hz	0.01	-0.01	0.00	0.00	0.00	0.07
<b>200 Hz</b>	199.526 Hz	0.00	-0.02	-0.02	0.01	-0.01	0.07
<b>250 Hz</b>	251.189 Hz	0.00	-0.02	-0.02	0.01	-0.01	0.07
<b>315 Hz</b>	316.228 Hz	-0.01	-0.02	-0.03	0.01	-0.02	0.07
<b>400 Hz</b>	398.107 Hz	-0.01	-0.02	-0.03	0.01	-0.02	0.07
<b>500 Hz</b>	501.187 Hz	-0.02	-0.02	-0.04	0.02	-0.02	0.08
<b>630 Hz</b>	630.957 Hz	-0.04	-0.02	-0.06	0.03	-0.03	0.09
<b>800 Hz</b>	794.328 Hz	-0.06	-0.01	-0.07	0.05	-0.02	0.10
<b>1000 Hz</b>	1000 Hz	-0.10	0.00	-0.10	0.08	-0.02	0.10
1060 Hz	1059.25 Hz	-0.11	-0.01	-0.12	0.09	-0.03	0.11
1120 Hz	1122.02 Hz	-0.13	-0.01	-0.14	0.10	-0.04	0.11
1180 Hz	1188.5 Hz	-0.14	-0.02	-0.16	0.12	-0.04	0.11
<b>1250 Hz</b>	1258.93 Hz	-0.16	-0.02	-0.18	0.13	-0.05	0.11
1320 Hz	1333.52 Hz	-0.18	-0.03	-0.21	0.14	-0.07	0.11
1400 Hz	1412.54 Hz	-0.19	-0.03	-0.22	0.16	-0.06	0.11
1500 Hz	1496.24 Hz	-0.21	-0.03	-0.24	0.18	-0.06	0.11
<b>1600 Hz</b>	1584.89 Hz	-0.24	-0.03	-0.27	0.20	-0.07	0.12
1700 Hz	1678.8 Hz	-0.27	-0.04	-0.31	0.22	-0.09	0.12
1800 Hz	1778.28 Hz	-0.30	-0.03	-0.33	0.25	-0.08	0.12
1900 Hz	1883.65 Hz	-0.33	-0.03	-0.36	0.28	-0.08	0.12
<b>2000 Hz</b>	1995.26 Hz	-0.36	-0.03	-0.39	0.31	-0.08	0.12
2120 Hz	2113.49 Hz	-0.40	-0.02	-0.42	0.34	-0.08	0.12
2240 Hz	2238.72 Hz	-0.45	-0.01	-0.46	0.38	-0.08	0.13
2360 Hz	2371.37 Hz	-0.49	0.00	-0.49	0.43	-0.06	0.13
<b>2500 Hz</b>	2511.89 Hz	-0.54	0.01	-0.53	0.47	-0.06	0.13
2650 Hz	2660.73 Hz	-0.59	0.02	-0.57	0.52	-0.05	0.13
2800 Hz	2818.38 Hz	-0.66	0.03	-0.63	0.58	-0.05	0.13
3000 Hz	2985.38 Hz	-0.73	0.05	-0.68	0.64	-0.04	0.13
<b>3150 Hz</b>	3162.28 Hz	-0.80	0.06	-0.74	0.71	-0.03	0.13
3350 Hz	3349.65 Hz	-0.88	0.08	-0.80	0.78	-0.02	0.14
3550 Hz	3548.13 Hz	-0.97	0.10	-0.87	0.86	-0.01	0.14
3750 Hz	3758.37 Hz	-1.06	0.11	-0.95	0.94	-0.01	0.14
<b>4000 Hz</b>	3981.07 Hz	-1.17	0.13	-1.04	1.03	-0.01	0.14
4250 Hz	4216.97 Hz	-1.28	0.15	-1.13	1.13	0.00	0.15
4500 Hz	4466.84 Hz	-1.40	0.17	-1.23	1.23	0.00	0.15
4750 Hz	4731.51 Hz	-1.53	0.19	-1.34	1.34	0.00	0.15
<b>5000 Hz</b>	5011.87 Hz	-1.67	0.22	-1.45	1.46	0.01	0.16
5300 Hz	5308.84 Hz	-1.83	0.26	-1.57	1.57	0.00	0.17
5600 Hz	5623.41 Hz	-2.00	0.31	-1.69	1.70	0.01	0.17
6000 Hz	5956.62 Hz	-2.17	0.35	-1.82	1.82	0.00	0.17
<b>6300 Hz</b>	6309.57 Hz	-2.35	0.40	-1.95	1.95	0.00	0.17
6700 Hz	6683.44 Hz	-2.54	0.48	-2.06	2.08	0.02	0.18
7100 Hz	7079.46 Hz	-2.74	0.56	-2.18	2.21	0.03	0.18
7500 Hz	7498.94 Hz	-2.97	0.65	-2.32	2.34	0.02	0.18
<b>8000 Hz</b>	7943.28 Hz	-3.22	0.77	-2.45	2.47	0.02	0.18
8500 Hz	8413.95 Hz	-3.50	0.91	-2.59	2.60	0.01	0.19
9000 Hz	8912.51 Hz	-3.84	1.09	-2.75	2.72	-0.03	0.19

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Nominal Frequency	Exact Frequency (6 digits)	Microphone Actuator Response dB	Microphone Diffuse-field Correction dB	Microphone Diffuse-field Response dB	Electrical Response dB	Acoustical Response dB	Expanded Uncertainty dB
<b>9500 Hz 10000 Hz 10600 Hz 11200 Hz</b>	9440.61 Hz	-4.22	1.32	-2.90	2.84	-0.06	0.23
	10000 Hz	-4.64	1.61	-3.03	2.96	-0.07	0.32
	10592.5 Hz	-5.10	1.98	-3.12	3.09	-0.03	0.33
	11220.2 Hz	-5.54	2.34	-3.20	3.23	0.03	0.35
<b>11800 Hz 12500 Hz 13200 Hz 14000 Hz</b>	11885 Hz	-5.98	2.62	-3.36	3.40	0.04	0.36
	12589.3 Hz	-6.34	2.71	-3.63	3.61	-0.02	0.38
	13335.2 Hz	-6.67	2.66	-4.01	3.89	-0.12	0.40
	14125.4 Hz	-6.99	2.61	-4.38	4.25	-0.13	0.42
<b>15000 Hz 16000 Hz 17000 Hz 18000 Hz</b>	14962.4 Hz	-7.39	2.67	-4.72	4.72	0.00	0.44
	15848.9 Hz	-7.83	2.74	-5.09	5.29	0.20	0.46
	16788 Hz	-8.33	2.55	-5.78	5.95	0.17	0.49
	17782.8 Hz	-8.97	2.32	-6.65	6.67	0.02	0.51
<b>19000 Hz 20000 Hz 21200 Hz 22400 Hz</b>	18836.5 Hz	-9.78	2.37	-7.41	7.41	0.00	0.53
	19952.6 Hz	-10.71	2.46	-8.25	8.10	-0.15	0.56
	21134.9 Hz	-11.74	2.43	-9.31	8.67	-0.64	0.59
	22387.2 Hz	-12.92	2.67	-10.25	9.06	-1.19	0.61

**Table A.8 Diffuse-field frequency response for Windscreen UA-1650, Microphone Type 4966, Microphone Preamplifier ZC-0032 and the analyzer with or without the microphone preamplifier connected to a microphone extension cable**

Nominal Frequency	Exact Frequency (6 digits)	Microphone Diffuse-field Response (From Table A.7) dB	Expanded Uncertainty dB	Influence of Windscreen dB	Expanded Uncertainty dB	Electrical Response dB	Acoustical Response dB	Expanded Uncertainty dB
<b>63 Hz</b>	63.0957 Hz	0.02	0.07	0.00	0.16	0.00	0.02	0.17
<b>80 Hz</b>	79.4328 Hz	0.02	0.07	0.00	0.16	0.00	0.02	0.17
<b>100 Hz</b>	100 Hz	0.01	0.07	0.00	0.16	0.00	0.01	0.17
<b>125 Hz</b>	125.893 Hz	0.00	0.07	0.00	0.16	0.00	0.00	0.17
<b>160 Hz</b>	158.489 Hz	0.00	0.07	0.00	0.16	0.00	0.00	0.17
<b>200 Hz</b>	199.526 Hz	-0.02	0.07	0.00	0.16	0.00	-0.02	0.17
<b>250 Hz</b>	251.189 Hz	-0.02	0.07	0.01	0.16	-0.01	-0.02	0.17
<b>315 Hz</b>	316.228 Hz	-0.03	0.07	0.02	0.16	-0.01	-0.02	0.17
<b>400 Hz</b>	398.107 Hz	-0.03	0.07	0.04	0.16	-0.02	-0.01	0.17
<b>500 Hz</b>	501.187 Hz	-0.04	0.08	0.06	0.16	-0.03	-0.02	0.18
<b>630 Hz</b>	630.957 Hz	-0.06	0.09	0.08	0.16	-0.05	-0.03	0.18
<b>800 Hz</b>	794.328 Hz	-0.07	0.10	0.11	0.16	-0.07	-0.04	0.19
<b>1000 Hz</b>	1000 Hz	-0.10	0.10	0.15	0.16	-0.10	-0.06	0.19
1060 Hz	1059.25 Hz	-0.12	0.11	0.17	0.17	-0.11	-0.06	0.20
1120 Hz	1122.02 Hz	-0.14	0.11	0.20	0.17	-0.12	-0.06	0.20
1180 Hz	1188.5 Hz	-0.16	0.11	0.24	0.17	-0.13	-0.05	0.20
<b>1250 Hz</b>	1258.93 Hz	-0.18	0.11	0.28	0.17	-0.14	-0.04	0.20
1320 Hz	1333.52 Hz	-0.21	0.11	0.32	0.18	-0.15	-0.04	0.21
1400 Hz	1412.54 Hz	-0.22	0.11	0.36	0.18	-0.15	-0.01	0.21
1500 Hz	1496.24 Hz	-0.24	0.11	0.40	0.18	-0.16	0.00	0.21
<b>1600 Hz</b>	1584.89 Hz	-0.27	0.12	0.44	0.19	-0.16	0.00	0.22
1700 Hz	1678.8 Hz	-0.31	0.12	0.48	0.21	-0.16	0.01	0.24
1800 Hz	1778.28 Hz	-0.33	0.12	0.52	0.21	-0.16	0.02	0.24
1900 Hz	1883.65 Hz	-0.36	0.12	0.55	0.21	-0.15	0.04	0.24
<b>2000 Hz</b>	1995.26 Hz	-0.39	0.12	0.58	0.25	-0.14	0.06	0.28
2120 Hz	2113.49 Hz	-0.42	0.12	0.62	0.25	-0.11	0.09	0.28
2240 Hz	2238.72 Hz	-0.46	0.13	0.64	0.25	-0.08	0.10	0.28
2360 Hz	2371.37 Hz	-0.49	0.13	0.67	0.25	-0.04	0.13	0.28
<b>2500 Hz</b>	2511.89 Hz	-0.53	0.13	0.68	0.25	0.01	0.16	0.28
2650 Hz	2660.73 Hz	-0.57	0.13	0.68	0.25	0.08	0.19	0.28
2800 Hz	2818.38 Hz	-0.63	0.13	0.66	0.25	0.16	0.19	0.28
3000 Hz	2985.38 Hz	-0.68	0.13	0.62	0.25	0.26	0.20	0.28
<b>3150 Hz</b>	3162.28 Hz	-0.74	0.13	0.55	0.25	0.37	0.18	0.28
3350 Hz	3349.65 Hz	-0.80	0.14	0.45	0.25	0.50	0.15	0.28
3550 Hz	3548.13 Hz	-0.87	0.14	0.33	0.25	0.65	0.10	0.28

Nominal Frequency	Exact Frequency (6 digits)	Microphone Diffuse-field Response (From Table A.7) dB	Expanded Uncertainty dB	Influence of Windscreen dB	Expanded Uncertainty dB	Electrical Response dB	Acoustical Response dB	Expanded Uncertainty dB
3750 Hz	3758.37 Hz	-0.95	0.14	0.18	0.25	0.81	0.05	0.28
<b>4000 Hz</b>	3981.07 Hz	-1.04	0.14	0.03	0.25	0.98	-0.03	0.29
4250 Hz	4216.97 Hz	-1.13	0.15	-0.13	0.25	1.16	-0.10	0.29
4500 Hz	4466.84 Hz	-1.23	0.15	-0.27	0.25	1.34	-0.16	0.29
4750 Hz	4731.51 Hz	-1.34	0.15	-0.39	0.32	1.53	-0.19	0.35
<b>5000 Hz</b>	5011.87 Hz	-1.45	0.16	-0.46	0.40	1.72	-0.19	0.43
5300 Hz	5308.84 Hz	-1.57	0.17	-0.50	0.51	1.90	-0.17	0.54
5600 Hz	5623.41 Hz	-1.69	0.17	-0.48	0.56	2.08	-0.10	0.58
6000 Hz	5956.62 Hz	-1.82	0.17	-0.44	0.56	2.24	-0.02	0.59
<b>6300 Hz</b>	6309.57 Hz	-1.95	0.17	-0.38	0.56	2.40	0.07	0.59
6700 Hz	6683.44 Hz	-2.06	0.18	-0.34	0.56	2.55	0.14	0.59
7100 Hz	7079.46 Hz	-2.18	0.18	-0.36	0.56	2.69	0.15	0.59
7500 Hz	7498.94 Hz	-2.32	0.18	-0.45	0.56	2.83	0.06	0.59
<b>8000 Hz</b>	7943.28 Hz	-2.45	0.18	-0.58	0.56	2.96	-0.07	0.59
8500 Hz	8413.95 Hz	-2.59	0.19	-0.71	0.56	3.10	-0.20	0.59
9000 Hz	8912.51 Hz	-2.75	0.19	-0.79	0.56	3.25	-0.29	0.59
9500 Hz	9440.61 Hz	-2.90	0.23	-0.82	0.56	3.43	-0.30	0.60
<b>10000 Hz</b>	10000 Hz	-3.03	0.32	-0.82	0.56	3.63	-0.22	0.64
10600 Hz	10592.5 Hz	-3.12	0.33	-0.86	0.84	3.88	-0.11	0.90
11200 Hz	11220.2 Hz	-3.20	0.35	-0.96	0.84	4.17	0.01	0.91
11800 Hz	11885 Hz	-3.36	0.36	-1.07	0.84	4.52	0.09	0.91
<b>12500 Hz</b>	12589.3 Hz	-3.63	0.38	-1.19	0.84	4.93	0.11	0.92
13200 Hz	13335.2 Hz	-4.01	0.40	-1.31	0.84	5.39	0.07	0.93
14000 Hz	14125.4 Hz	-4.38	0.42	-1.43	0.84	5.89	0.08	0.94
15000 Hz	14962.4 Hz	-4.72	0.44	-1.53	0.85	6.42	0.18	0.96
<b>16000 Hz</b>	15848.9 Hz	-5.09	0.46	-1.63	0.85	6.96	0.24	0.97
17000 Hz	16788 Hz	-5.78	0.49	-1.77	0.85	7.49	-0.06	0.98
18000 Hz	17782.8 Hz	-6.65	0.51	-1.92	0.85	8.00	-0.57	0.99
19000 Hz	18836.5 Hz	-7.41	0.53	-1.98	0.85	8.47	-0.92	1.00
<b>20000 Hz</b>	19952.6 Hz	-8.25	0.56	-2.07	0.85	8.87	-1.45	1.02
21200 Hz	21134.9 Hz	-9.31	0.59	-2.18	0.85	9.18	-2.31	1.03
22400 Hz	22387.2 Hz	-10.25	0.61	-2.19	0.85	9.37	-3.07	1.05

**Table A.9** Microphone Type 4966 is not specified together with Outdoor Microphone Kit UA-1404

## A.4 Free-field Frequency Responses for Diffuse-field Calibrated Instruments

Free-field frequency response in the reference direction for diffuse-field calibrated instruments according to IEC 60651 and IEC 60804. Measured with plane progressive sinusoidal sound waves incident from the reference direction and the analyzer's **Sound Field Correction** parameter set to *Diffuse-field*, see section 4.6.

**Table A.10** Free-field 0° frequency response with the **Sound Field Correction** parameter set to *Diffuse-field* for the configurations for which there are specified normal Free-field responses

Nominal Frequency	Exact Frequency (6 digits)	Configuration as in Table A.2 dB	Configuration as in Table A.3 dB	Configuration as in Table A.4 dB	Configuration as in Table A.5 dB
<b>63 Hz</b>	63.0957 Hz	0.03	0.03	0.03	0.03
<b>80 Hz</b>	79.4328 Hz	0.02	0.02	0.02	0.02
<b>100 Hz</b>	100 Hz	0.02	0.02	0.02	0.02
<b>125 Hz</b>	125.893 Hz	0.01	0.01	0.01	0.01
<b>160 Hz</b>	158.489 Hz	0.01	0.02	0.01	0.02
<b>200 Hz</b>	199.526 Hz	0.01	0.04	0.00	0.03
<b>250 Hz</b>	251.189 Hz	0.01	0.07	0.00	0.07
<b>315 Hz</b>	316.228 Hz	0.00	0.13	0.01	0.14
<b>400 Hz</b>	398.107 Hz	0.01	0.22	0.03	0.23
<b>500 Hz</b>	501.187 Hz	0.02	0.24	0.04	0.26
<b>630 Hz</b>	630.957 Hz	0.02	0.09	0.04	0.11

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Nominal Frequency	Exact Frequency (6 digits)	Configuration as in Table A.2 dB	Configuration as in Table A.3 dB	Configuration as in Table A.4 dB	Configuration as in Table A.5 dB
<b>800 Hz</b>	794.328 Hz	0.04	-0.07	0.06	-0.05
<b>1000 Hz</b>	1000 Hz	0.06	-0.01	0.06	-0.01
1060 Hz	1059.25 Hz	0.07	-0.04	0.08	-0.02
1120 Hz	1122.02 Hz	0.06	-0.11	0.09	-0.08
1180 Hz	1188.5 Hz	0.08	-0.18	0.12	-0.14
<b>1250 Hz</b>	1258.93 Hz	0.08	-0.22	0.14	-0.17
1320 Hz	1333.52 Hz	0.08	-0.16	0.16	-0.08
1400 Hz	1412.54 Hz	0.11	0.03	0.21	0.13
1500 Hz	1496.24 Hz	0.12	0.22	0.24	0.33
<b>1600 Hz</b>	1584.89 Hz	0.13	0.30	0.27	0.44
1700 Hz	1678.8 Hz	0.15	0.22	0.31	0.38
1800 Hz	1778.28 Hz	0.17	0.05	0.35	0.23
1900 Hz	1883.65 Hz	0.20	-0.01	0.41	0.19
<b>2000 Hz</b>	1995.26 Hz	0.24	0.15	0.46	0.37
2120 Hz	2113.49 Hz	0.26	0.38	0.51	0.63
2240 Hz	2238.72 Hz	0.30	0.39	0.55	0.64
2360 Hz	2371.37 Hz	0.36	0.05	0.61	0.31
<b>2500 Hz</b>	2511.89 Hz	0.40	0.23	0.66	0.49
2650 Hz	2660.73 Hz	0.46	0.64	0.72	0.90
2800 Hz	2818.38 Hz	0.51	0.60	0.77	0.86
3000 Hz	2985.38 Hz	0.57	0.44	0.82	0.69
<b>3150 Hz</b>	3162.28 Hz	0.64	0.80	0.85	1.01
3350 Hz	3349.65 Hz	0.71	0.74	0.87	0.90
3550 Hz	3548.13 Hz	0.79	0.66	0.88	0.75
3750 Hz	3758.37 Hz	0.87	1.07	0.90	1.10
<b>4000 Hz</b>	3981.07 Hz	0.95	0.86	0.95	0.85
4250 Hz	4216.97 Hz	1.05	1.04	1.03	1.02
4500 Hz	4466.84 Hz	1.15	1.24	1.13	1.22
4750 Hz	4731.51 Hz	1.26	1.09	1.27	1.10
<b>5000 Hz</b>	5011.87 Hz	1.38	1.14	1.45	1.21
5300 Hz	5308.84 Hz	1.48	1.39	1.64	1.55
5600 Hz	5623.41 Hz	1.63	1.57	1.85	1.80
6000 Hz	5956.62 Hz	1.76	1.79	2.05	2.08
<b>6300 Hz</b>	6309.57 Hz	1.91	1.97	2.25	2.31
6700 Hz	6683.44 Hz	2.09	2.14	2.40	2.45
7100 Hz	7079.46 Hz	2.29	2.26	2.49	2.46
7500 Hz	7498.94 Hz	2.46	2.38	2.59	2.51
<b>8000 Hz</b>	7943.28 Hz	2.66	2.57	2.74	2.65
8500 Hz	8413.95 Hz	2.86	2.67	2.89	2.70
9000 Hz	8912.51 Hz	3.03	3.03	3.12	3.11
9500 Hz	9440.61 Hz	3.24	3.34	3.36	3.47
<b>10000 Hz</b>	10000 Hz	3.48	3.63	3.63	3.78
10600 Hz	10592.5 Hz	3.77	3.62	3.93	3.79
11200 Hz	11220.2 Hz	4.10	3.97	4.30	4.17
11800 Hz	11885 Hz	4.39	4.47	4.65	4.73
<b>12500 Hz</b>	12589.3 Hz	4.61	4.76	5.05	5.20
13200 Hz	13335.2 Hz	4.82	4.82	5.32	5.32
14000 Hz	14125.4 Hz	5.12	5.05	5.63	5.56
15000 Hz	14962.4 Hz	5.58	5.63	6.08	6.12
<b>16000 Hz</b>	15848.9 Hz	6.13	6.24	6.47	6.58
17000 Hz	16788 Hz	6.45	6.44	6.49	6.48
18000 Hz	17782.8 Hz	6.68	6.62	6.40	6.34
19000 Hz	18836.5 Hz	7.06	7.18	6.48	6.60
<b>20000 Hz</b>	19952.6 Hz	7.32	7.32	6.36	6.36
21200 Hz	21134.9 Hz	7.27	7.31	5.97	6.01
22400 Hz	22387.2 Hz	7.15	7.32	5.67	5.84

## A.5 Directional Responses

Directional responses for plane progressive sinusoidal sound waves normalised to the response in the reference direction, including sensitivity variations.

**Table A.11** Directional response for Microphone Type 4966 and Microphone Preamplifier ZC-0032 with the microphone preamplifier connected to a microphone extension cable, 500 Hz – 3550 Hz, in dB

**Table A.12** Directional response for Microphone Type 4966 and Microphone Preamplifier ZC-0032 with the microphone preamplifier connected to a microphone extension cable, 4000 Hz – 10600 Hz, in dB

**Table A.13** Directional response for Microphone Type 4966 and Microphone Preamplifier ZC-0032 with the microphone preamplifier connected to a microphone extension cable, 11200 Hz – 20000 Hz, in dB

Frequency												
Angle	11200 Hz	11800 Hz	<b>12500 Hz</b>	13200 Hz	14000 Hz	15000 Hz	<b>16000 Hz</b>	17000 Hz	18000 Hz	19000 Hz	<b>20000 Hz</b>	
0°	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5°	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.05	-0.05	-0.05	-0.05	
10°	-0.10	-0.11	-0.12	-0.12	-0.13	-0.14	-0.15	-0.16	-0.17	-0.18	-0.19	
15°	-0.19	-0.21	-0.22	-0.24	-0.25	-0.27	-0.29	-0.32	-0.34	-0.37	-0.40	
20°	-0.32	-0.35	-0.38	-0.41	-0.44	-0.48	-0.52	-0.57	-0.62	-0.68	-0.73	
25°	-0.57	-0.61	-0.66	-0.71	-0.76	-0.82	-0.88	-0.95	-1.02	-1.10	-1.19	
30°	-0.79	-0.85	-0.91	-0.98	-1.05	-1.14	-1.23	-1.33	-1.45	-1.57	-1.70	
35°	-1.06	-1.14	-1.23	-1.32	-1.42	-1.53	-1.65	-1.78	-1.94	-2.11	-2.31	
40°	-1.40	-1.50	-1.61	-1.73	-1.85	-1.99	-2.14	-2.31	-2.51	-2.73	-2.98	
45°	-1.74	-1.87	-2.01	-2.16	-2.31	-2.48	-2.67	-2.89	-3.13	-3.41	-3.74	
50°	-2.12	-2.28	-2.44	-2.62	-2.81	-3.01	-3.24	-3.49	-3.78	-4.11	-4.50	
55°	-2.50	-2.69	-2.89	-3.11	-3.33	-3.58	-3.85	-4.15	-4.49	-4.88	-5.34	
60°	-2.89	-3.11	-3.35	-3.61	-3.88	-4.18	-4.50	-4.86	-5.26	-5.71	-6.22	
65°	-3.28	-3.54	-3.81	-4.11	-4.43	-4.78	-5.16	-5.58	-6.04	-6.55	-7.12	
70°	-3.67	-3.96	-4.26	-4.60	-4.96	-5.36	-5.80	-6.29	-6.82	-7.41	-8.07	
75°	-4.06	-4.37	-4.71	-5.07	-5.48	-5.93	-6.42	-6.97	-7.58	-8.25	-9.00	
80°	-4.46	-4.80	-5.16	-5.56	-6.00	-6.48	-7.01	-7.61	-8.28	-9.03	-9.87	
85°	-4.89	-5.26	-5.66	-6.08	-6.55	-7.06	-7.63	-8.26	-8.98	-9.80	-10.74	
90°	-5.30	-5.70	-6.12	-6.58	-7.07	-7.61	-8.20	-8.87	-9.62	-10.50	-11.50	
95°	-5.65	-6.08	-6.55	-7.04	-7.57	-8.14	-8.76	-9.45	-10.24	-11.14	-12.18	
100°	-5.93	-6.40	-6.90	-7.44	-8.02	-8.64	-9.31	-10.05	-10.86	-11.78	-12.82	
105°	-6.21	-6.71	-7.24	-7.81	-8.42	-9.07	-9.78	-10.56	-11.43	-12.40	-13.52	
110°	-6.47	-7.00	-7.56	-8.15	-8.77	-9.44	-10.16	-10.96	-11.86	-12.89	-14.08	
115°	-6.63	-7.19	-7.79	-8.42	-9.08	-9.79	-10.54	-11.36	-12.26	-13.27	-14.44	
120°	-6.70	-7.29	-7.91	-8.57	-9.27	-10.02	-10.82	-11.69	-12.64	-13.69	-14.88	
125°	-6.70	-7.28	-7.91	-8.58	-9.30	-10.08	-10.93	-11.86	-12.87	-13.99	-15.23	
130°	-6.66	-7.23	-7.85	-8.53	-9.27	-10.07	-10.95	-11.90	-12.95	-14.08	-15.33	
135°	-6.72	-7.26	-7.85	-8.48	-9.17	-9.92	-10.75	-11.67	-12.71	-13.89	-15.22	
140°	-6.76	-7.33	-7.93	-8.57	-9.25	-9.98	-10.77	-11.62	-12.57	-13.63	-14.85	
145°	-6.70	-7.26	-7.86	-8.50	-9.19	-9.93	-10.75	-11.64	-12.63	-13.73	-14.96	
150°	-6.58	-7.13	-7.73	-8.37	-9.07	-9.82	-10.64	-11.53	-12.51	-13.58	-14.76	
155°	-6.60	-7.15	-7.73	-8.34	-9.00	-9.71	-10.48	-11.31	-12.24	-13.27	-14.43	
160°	-6.46	-7.05	-7.68	-8.34	-9.05	-9.81	-10.61	-11.47	-12.38	-13.37	-14.45	
165°	-5.96	-6.54	-7.16	-7.83	-8.55	-9.34	-10.19	-11.11	-12.11	-13.20	-14.41	
170°	-5.41	-5.92	-6.48	-7.08	-7.73	-8.45	-9.22	-10.07	-11.00	-12.02	-13.14	
175°	-5.10	-5.57	-6.08	-6.64	-7.24	-7.90	-8.61	-9.38	-10.23	-11.16	-12.17	
180°	-5.02	-5.49	-5.99	-6.54	-7.13	-7.77	-8.48	-9.24	-10.08	-11.00	-12.00	
185°	-5.21	-5.69	-6.22	-6.80	-7.42	-8.11	-8.85	-9.66	-10.56	-11.54	-12.62	
190°	-5.64	-6.18	-6.77	-7.41	-8.11	-8.87	-9.70	-10.62	-11.64	-12.76	-14.01	
195°	-6.21	-6.80	-7.45	-8.16	-8.93	-9.76	-10.68	-11.68	-12.78	-13.99	-15.31	
200°	-6.63	-7.24	-7.90	-8.62	-9.40	-10.24	-11.15	-12.13	-13.19	-14.30	-15.48	
205°	-6.80	-7.39	-8.02	-8.71	-9.45	-10.25	-11.10	-12.01	-12.99	-14.02	-15.13	
210°	-6.82	-7.39	-8.00	-8.66	-9.38	-10.17	-11.04	-11.99	-13.06	-14.23	-15.53	
215°	-6.85	-7.45	-8.10	-8.81	-9.58	-10.41	-11.31	-12.27	-13.30	-14.39	-15.53	
220°	-6.97	-7.56	-8.20	-8.87	-9.60	-10.38	-11.22	-12.14	-13.17	-14.32	-15.62	
225°	-6.88	-7.45	-8.09	-8.78	-9.53	-10.37	-11.29	-12.30	-13.41	-14.62	-15.93	
230°	-6.84	-7.45	-8.11	-8.84	-9.63	-10.50	-11.44	-12.46	-13.55	-14.70	-15.93	
235°	-6.88	-7.50	-8.16	-8.88	-9.66	-10.49	-11.39	-12.36	-13.40	-14.53	-15.74	
240°	-6.90	-7.50	-8.15	-8.85	-9.59	-10.38	-11.23	-12.14	-13.14	-14.24	-15.45	
245°	-6.81	-7.39	-8.02	-8.67	-9.37	-10.11	-10.90	-11.78	-12.74	-13.83	-15.07	
250°	-6.61	-7.16	-7.75	-8.38	-9.05	-9.77	-10.56	-11.42	-12.38	-13.44	-14.64	
255°	-6.34	-6.86	-7.43	-8.04	-8.70	-9.41	-10.19	-11.03	-11.94	-12.94	-14.04	
260°	-6.09	-6.59	-7.12	-7.69	-8.30	-8.97	-9.68	-10.46	-11.32	-12.27	-13.34	
265°	-5.78	-6.24	-6.74	-7.27	-7.83	-8.45	-9.12	-9.86	-10.69	-11.63	-12.72	
270°	-5.40	-5.82	-6.28	-6.76	-7.30	-7.88	-8.52	-9.24	-10.06	-10.99	-12.05	
275°	-5.00	-5.39	-5.81	-6.27	-6.77	-7.31	-7.92	-8.61	-9.40	-10.29	-11.31	
280°	-4.56	-4.92	-5.32	-5.75	-6.24	-6.78	-7.38	-8.04	-8.77	-9.57	-10.44	
285°	-4.17	-4.51	-4.87	-5.27	-5.71	-6.21	-6.75	-7.35	-8.02	-8.75	-9.55	
290°	-3.79	-4.09	-4.43	-4.80	-5.20	-5.65	-6.15	-6.69	-7.28	-7.93	-8.63	
295°	-3.38	-3.66	-3.96	-4.29	-4.65	-5.05	-5.48	-5.95	-6.47	-7.03	-7.64	
300°	-2.97	-3.22	-3.48	-3.76	-4.07	-4.41	-4.77	-5.18	-5.62	-6.12	-6.67	
305°	-2.61	-2.82	-3.04	-3.29	-3.55	-3.83	-4.15	-4.50	-4.88	-5.32	-5.81	
310°	-2.19	-2.36	-2.55	-2.75	-2.97	-3.21	-3.48	-3.77	-4.10	-4.47	-4.89	
315°	-1.81	-1.96	-2.11	-2.28	-2.46	-2.66	-2.88	-3.13	-3.40	-3.71	-4.06	
320°	-1.45	-1.57	-1.69	-1.83	-1.98	-2.15	-2.34	-2.54	-2.77	-3.02	-3.30	
325°	-1.14	-1.23	-1.33	-1.44	-1.56	-1.69	-1.84	-2.00	-2.18	-2.38	-2.59	
330°	-0.86	-0.93	-1.01	-1.10	-1.19	-1.29	-1.41	-1.53	-1.66	-1.80	-1.95	
335°	-0.62	-0.67	-0.73	-0.79	-0.86	-0.93	-1.01	-1.10	-1.19	-1.28	-1.39	
340°	-0.39	-0.43	-0.46	-0.50	-0.55	-0.60	-0.65	-0.71	-0.77	-0.83	-0.90	
345°	-0.23	-0.25	-0.27	-0.29	-0.32	-0.35	-0.38	-0.42	-0.45	-0.49	-0.53	
350°	-0.12	-0.13	-0.14	-0.15	-0.17	-0.18	-0.19	-0.21	-0.22	-0.24	-0.25	
355°	-0.03	-0.03	-0.03	-0.04	-0.04	-0.05	-0.05	-0.06	-0.06	-0.07	-0.07	

**Microphone Type 4966 for Hand-held Analyzer Types 2250, 2250-L and 2270 –  
Supplement to Instruction Manual BE 1712**

**Table A.14** Sensitivity variations for Microphone Type 4966 and Microphone Preamplifier ZC-0032 with the microphone preamplifier connected to a microphone extension cable, at sound incidence angles within  $\pm 60^\circ$  from the reference direction

Nominal Frequency	Exact Frequency	Max Variation $\pm 30^\circ$ dB	Max Variation $\pm 90^\circ$ dB	Max Variation $\pm 150^\circ$ dB
<b>500 Hz</b>	0.501 Hz	0.01	0.05	0.06
<b>630 Hz</b>	0.631 Hz	0.01	0.07	0.08
<b>800 Hz</b>	0.794 Hz	0.02	0.09	0.10
<b>1000 Hz</b>	1000 Hz	0.02	0.11	0.12
<b>1250 Hz</b>	1.259 Hz	0.03	0.16	0.24
<b>1600 Hz</b>	1.585 Hz	0.04	0.24	0.38
<b>2000 Hz</b>	1.995 Hz	0.06	0.35	0.55
2240 Hz	2.239 Hz	0.07	0.43	0.65
<b>2500 Hz</b>	2.512 Hz	0.09	0.52	0.77
2800 Hz	2.818 Hz	0.11	0.64	0.90
<b>3150 Hz</b>	3.162 Hz	0.14	0.78	1.06
3550 Hz	3.548 Hz	0.17	0.95	1.25
<b>4000 Hz</b>	3.981 Hz	0.21	1.15	1.49
4500 Hz	4.467 Hz	0.25	1.39	1.78
<b>5000 Hz</b>	5.012 Hz	0.30	1.67	2.12
5600 Hz	5.623 Hz	0.35	2.01	2.54
<b>6300 Hz</b>	6.310 Hz	0.41	2.40	3.02
7100 Hz	7.079 Hz	0.48	2.85	3.58
<b>8000 Hz</b>	7.943 Hz	0.56	3.38	4.23
8500 Hz	8.414 Hz	0.60	3.66	4.59
9000 Hz	8.913 Hz	0.65	3.97	4.98
9500 Hz	9.441 Hz	0.70	4.30	5.42
<b>10000 Hz</b>	10000 Hz	0.75	4.64	5.90
10600 Hz	10.593 Hz	0.81	5.01	6.42
11200 Hz	11.220 Hz	0.87	5.41	6.98
11800 Hz	11.885 Hz	0.94	5.83	7.57
<b>12500 Hz</b>	12.589 Hz	1.02	6.28	8.20
13200 Hz	13.335 Hz	1.10	6.77	8.88
14000 Hz	14.125 Hz	1.19	7.30	9.66
15000 Hz	14.962 Hz	1.30	7.88	10.50
<b>16000 Hz</b>	15.849 Hz	1.41	8.52	11.44
17000 Hz	16.788 Hz	1.53	9.24	12.46
18000 Hz	17.783 Hz	1.67	10.06	13.55
19000 Hz	18.836 Hz	1.81	10.99	14.71
<b>20000 Hz</b>	19.953 Hz	1.96	12.05	15.94

**Table A.15** Influence of the analyzer's body on the directional response, measured in a plane parallel to the display and along the microphone's axis, 500 Hz – 3550 Hz

Frequency												
Angle	500 Hz	630 Hz	800 Hz	1000 Hz	1250 Hz	1600 Hz	2000 Hz	2240 Hz	2500 Hz	2800 Hz	3150 Hz	3550 Hz
0°	0.01	0.01	-0.01	0.00	0.00	0.00	0.01	0.00	-0.01	-0.01	0.00	0.00
5°	0.00	0.01	0.00	0.00	0.00	0.00	-0.01	0.01	-0.03	-0.01	-0.01	0.00
10°	0.00	0.01	-0.01	0.00	0.00	0.00	-0.04	0.03	-0.06	0.02	-0.05	-0.02
15°	-0.01	0.00	-0.02	0.02	-0.01	-0.01	-0.08	0.05	-0.11	0.07	-0.11	-0.02
20°	0.00	0.02	0.00	0.01	0.00	-0.02	-0.14	0.10	-0.16	0.12	-0.18	0.04
25°	0.01	0.04	0.00	0.02	0.00	-0.04	-0.20	0.13	-0.18	0.16	-0.26	0.14
30°	0.00	0.04	0.01	0.01	0.03	-0.08	-0.24	0.12	-0.17	0.15	-0.30	0.25
35°	0.01	0.06	0.03	0.02	0.06	-0.16	-0.25	0.06	-0.09	0.07	-0.26	0.29
40°	0.01	0.08	0.06	0.01	0.10	-0.25	-0.22	-0.06	0.04	-0.05	-0.16	0.23
45°	0.00	0.11	0.10	0.00	0.16	-0.36	-0.13	-0.19	0.14	-0.15	-0.07	0.12
50°	0.00	0.15	0.15	-0.02	0.22	-0.44	-0.02	-0.28	0.14	-0.14	-0.08	0.09
55°	-0.04	0.16	0.20	-0.02	0.26	-0.48	0.05	-0.24	-0.01	-0.01	-0.18	0.19
60°	-0.05	0.16	0.26	-0.01	0.28	-0.45	0.01	-0.10	-0.21	0.09	-0.26	0.25
65°	-0.06	0.15	0.31	0.02	0.27	-0.35	-0.14	0.03	-0.30	0.02	-0.18	0.16
70°	-0.09	0.15	0.37	0.07	0.25	-0.21	-0.34	0.02	-0.16	-0.21	-0.09	0.08
75°	-0.12	0.12	0.38	0.15	0.23	-0.08	-0.45	-0.17	0.04	-0.34	-0.18	0.16
80°	-0.14	0.08	0.39	0.24	0.23	-0.01	-0.38	-0.41	0.02	-0.20	-0.43	0.21
85°	-0.17	0.05	0.38	0.32	0.27	-0.02	-0.15	-0.49	-0.25	-0.04	-0.47	0.01
90°	-0.19	0.01	0.34	0.39	0.35	-0.06	0.09	-0.28	-0.49	-0.18	-0.28	-0.19
95°	-0.22	-0.05	0.28	0.42	0.47	-0.10	0.21	0.06	-0.36	-0.49	-0.30	-0.05
100°	-0.23	-0.08	0.20	0.40	0.58	-0.05	0.18	0.28	0.07	-0.48	-0.60	0.04
105°	-0.28	-0.15	0.12	0.34	0.66	0.07	0.09	0.26	0.39	-0.01	-0.63	-0.22
110°	-0.29	-0.18	0.04	0.23	0.66	0.21	0.07	0.11	0.41	0.41	-0.12	-0.25
115°	-0.30	-0.23	-0.03	0.09	0.59	0.30	0.19	0.06	0.22	0.43	0.35	0.33
120°	-0.30	-0.25	-0.08	-0.06	0.45	0.29	0.37	0.19	0.14	0.19	0.35	0.82
125°	-0.29	-0.26	-0.11	-0.19	0.25	0.15	0.46	0.40	0.28	0.09	0.05	0.72
130°	-0.29	-0.27	-0.12	-0.28	0.06	-0.08	0.37	0.48	0.47	0.29	-0.04	0.35
135°	-0.28	-0.27	-0.10	-0.32	-0.10	-0.34	0.11	0.31	0.47	0.47	0.18	0.35
140°	-0.24	-0.24	-0.07	-0.30	-0.19	-0.55	-0.24	-0.06	0.18	0.33	0.27	0.59
145°	-0.24	-0.21	-0.03	-0.24	-0.21	-0.65	-0.55	-0.48	-0.27	-0.13	-0.06	0.49
150°	-0.18	-0.19	0.02	-0.17	-0.15	-0.63	-0.69	-0.75	-0.67	-0.67	-0.67	-0.09
155°	-0.18	-0.17	0.07	-0.08	-0.06	-0.51	-0.64	-0.76	-0.81	-0.95	-1.16	-0.77
160°	-0.15	-0.14	0.12	0.00	0.05	-0.36	-0.47	-0.58	-0.67	-0.86	-1.20	-1.03
165°	-0.15	-0.11	0.15	0.08	0.14	-0.21	-0.27	-0.33	-0.40	-0.55	-0.89	-0.76
170°	-0.14	-0.11	0.18	0.13	0.22	-0.10	-0.10	-0.10	-0.13	-0.21	-0.49	-0.30
175°	-0.13	-0.10	0.19	0.18	0.27	-0.02	0.01	0.05	0.05	0.02	-0.20	0.06
180°	-0.12	-0.10	0.20	0.18	0.28	0.00	0.05	0.10	0.12	0.10	-0.10	0.20
185°	-0.12	-0.10	0.19	0.17	0.27	-0.02	0.01	0.06	0.06	0.02	-0.19	0.08
190°	-0.12	-0.10	0.19	0.15	0.22	-0.09	-0.10	-0.09	-0.11	-0.19	-0.47	-0.27
195°	-0.15	-0.13	0.16	0.10	0.15	-0.21	-0.27	-0.30	-0.38	-0.52	-0.88	-0.74
200°	-0.17	-0.15	0.13	0.02	0.04	-0.35	-0.47	-0.55	-0.66	-0.85	-1.21	-1.05
205°	-0.20	-0.17	0.09	-0.06	-0.07	-0.49	-0.63	-0.73	-0.82	-0.97	-1.20	-0.82
210°	-0.19	-0.19	0.04	-0.15	-0.16	-0.60	-0.68	-0.72	-0.71	-0.71	-0.71	-0.12
215°	-0.24	-0.24	-0.01	-0.23	-0.22	-0.62	-0.54	-0.48	-0.32	-0.17	-0.06	0.51
220°	-0.25	-0.25	-0.05	-0.29	-0.22	-0.52	-0.24	-0.08	0.17	0.34	0.32	0.64
225°	-0.27	-0.27	-0.08	-0.30	-0.13	-0.31	0.13	0.30	0.51	0.53	0.27	0.39
230°	-0.29	-0.28	-0.09	-0.27	0.04	-0.05	0.40	0.50	0.55	0.38	0.02	0.33
235°	-0.30	-0.29	-0.08	-0.20	0.24	0.18	0.50	0.45	0.36	0.16	0.03	0.68
240°	-0.29	-0.26	-0.06	-0.08	0.45	0.32	0.42	0.26	0.18	0.19	0.31	0.85
245°	-0.30	-0.22	-0.01	0.06	0.62	0.33	0.25	0.11	0.22	0.41	0.37	0.41
250°	-0.28	-0.18	0.05	0.21	0.71	0.24	0.12	0.14	0.39	0.43	-0.05	-0.20
255°	-0.24	-0.14	0.13	0.33	0.71	0.09	0.12	0.25	0.41	0.06	-0.57	-0.21
260°	-0.22	-0.09	0.21	0.40	0.65	-0.04	0.21	0.27	0.14	-0.41	-0.60	0.06
265°	-0.20	-0.04	0.28	0.43	0.53	-0.08	0.24	0.09	-0.27	-0.48	-0.31	-0.02
270°	-0.16	0.01	0.34	0.41	0.41	-0.05	0.12	-0.22	-0.45	-0.20	-0.25	-0.18
275°	-0.15	0.06	0.39	0.36	0.31	0.00	-0.12	-0.43	-0.26	-0.03	-0.43	0.03
280°	-0.11	0.08	0.40	0.28	0.25	0.02	-0.34	-0.39	0.00	-0.15	-0.42	0.28
285°	-0.08	0.11	0.39	0.19	0.24	-0.03	-0.41	-0.18	0.06	-0.28	-0.18	0.25
290°	-0.08	0.11	0.37	0.11	0.26	-0.15	-0.30	-0.01	-0.09	-0.18	-0.02	0.14
295°	-0.04	0.15	0.33	0.06	0.28	-0.29	-0.12	0.02	-0.21	0.03	-0.09	0.21
300°	-0.02	0.14	0.28	0.02	0.28	-0.40	0.01	-0.09	-0.15	0.13	-0.19	0.30
305°	-0.01	0.14	0.23	0.00	0.26	-0.44	0.05	-0.21	0.03	0.06	-0.15	0.23
310°	-0.02	0.13	0.18	0.00	0.22	-0.41	-0.02	-0.23	0.16	-0.05	-0.04	0.10
315°	0.01	0.11	0.12	0.01	0.17	-0.33	-0.12	-0.15	0.17	-0.07	-0.02	0.09
320°	0.02	0.08	0.09	0.01	0.12	-0.22	-0.21	-0.02	0.08	0.01	-0.10	0.23
325°	0.00	0.05	0.05	0.02	0.07	-0.13	-0.25	0.09	-0.03	0.11	-0.22	0.32
330°	0.00	0.05	0.02	0.01	0.04	-0.06	-0.24	0.15	-0.10	0.18	-0.28	0.30
335°	0.01	0.01	0.02	0.01	0.01	-0.02	-0.18	0.15	-0.12	0.20	-0.26	0.20
340°	0.01	0.02	0.01	0.01	0.00	0.00	-0.13	0.12	-0.10	0.16	-0.19	0.10
345°	0.01	0.01	0.01	-0.01	0.00	0.01	-0.07	0.08	-0.05	0.11	-0.11	0.03
350°	0.00	0.00	0.01	-0.01	-0.01	0.01	-0.03	0.04	-0.01	0.07	-0.06	0.00
355°	0.01	0.00	0.01	0.00	0.00	0.01	-0.01	0.01	0.02	0.04	-0.02	0.00

**Microphone Type 4966 for Hand-held Analyzer Types 2250, 2250-L and 2270 –  
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**Table A.16 Influence of the analyzer's body on the directional response, measured in a plane parallel to the display and along the microphone's axis, 4000 Hz – 10600 Hz**

Angle	Frequency											
	4000 Hz	4500 Hz	5000 Hz	5600 Hz	6300 Hz	7100 Hz	8000 Hz	8500 Hz	9000 Hz	9500 Hz	10000 Hz	10600 Hz
0°	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
5°	0.01	0.02	0.02	-0.01	-0.04	-0.01	-0.02	-0.02	-0.02	-0.04	-0.02	-0.02
10°	0.06	0.07	0.06	-0.02	-0.11	0.00	-0.06	-0.08	-0.06	-0.12	-0.07	-0.08
15°	0.15	0.14	0.11	-0.02	-0.20	0.06	-0.10	-0.13	-0.09	-0.21	-0.14	-0.16
20°	0.26	0.20	0.15	0.00	-0.32	0.13	-0.09	-0.11	-0.04	-0.22	-0.14	-0.09
25°	0.33	0.17	0.14	0.03	-0.38	0.12	0.04	-0.03	0.07	-0.21	-0.06	0.12
30°	0.30	0.05	0.09	0.05	-0.23	0.09	0.08	-0.04	0.03	-0.33	-0.08	0.19
35°	0.18	-0.07	0.08	-0.03	-0.10	0.29	-0.08	-0.02	-0.04	-0.31	-0.22	0.16
40°	0.09	-0.03	0.25	-0.16	-0.26	0.38	-0.06	0.11	-0.01	-0.16	-0.30	0.24
45°	0.12	0.09	0.46	-0.12	-0.43	-0.05	-0.05	-0.03	0.05	-0.21	-0.34	0.05
50°	0.20	0.10	0.47	-0.04	-0.34	0.07	-0.04	0.01	0.14	-0.27	-0.16	-0.05
55°	0.16	0.03	0.42	-0.09	-0.50	0.06	0.26	-0.13	0.17	-0.18	-0.28	0.20
60°	0.05	0.04	0.48	0.09	-0.43	-0.21	-0.02	0.14	0.00	-0.03	-0.45	0.26
65°	0.10	0.06	0.47	0.21	-0.33	-0.10	0.02	-0.01	0.13	-0.13	-0.26	0.08
70°	0.21	0.06	0.35	0.17	-0.26	-0.28	-0.26	-0.11	0.12	-0.08	-0.19	0.18
75°	0.14	0.09	0.33	0.29	0.01	-0.09	-0.09	-0.34	-0.08	0.08	-0.32	0.27
80°	0.07	0.09	0.54	0.01	0.02	0.09	-0.12	-0.21	-0.46	-0.17	-0.05	-0.07
85°	0.13	0.07	0.61	-0.04	-0.01	0.18	-0.03	-0.05	-0.25	-0.67	-0.24	0.09
90°	-0.02	-0.02	0.58	0.21	-0.50	0.32	0.06	0.16	-0.01	-0.37	-0.75	0.02
95°	-0.32	-0.17	0.58	0.32	-0.03	0.08	0.06	0.09	0.24	-0.16	-0.43	-0.11
100°	-0.25	-0.40	0.20	0.43	-0.09	0.20	0.07	-0.01	0.05	-0.01	-0.12	0.10
105°	-0.10	-0.51	-0.07	-0.01	0.23	0.24	0.15	0.10	-0.12	-0.13	-0.09	0.12
110°	-0.27	-0.30	-0.16	-0.54	-0.56	0.45	0.28	0.59	0.26	0.03	-0.36	0.21
115°	-0.18	-0.35	-0.01	-0.55	-0.88	-0.23	0.23	0.08	0.43	0.44	0.17	0.68
120°	0.46	-0.15	0.16	-0.34	-0.99	-0.71	-0.89	-0.21	-0.06	-0.12	0.22	0.86
125°	0.87	0.62	0.59	0.15	-0.55	-0.78	-0.88	-0.96	-1.29	-1.01	-0.76	-0.19
130°	0.61	0.84	1.28	0.60	0.25	0.14	-0.84	-0.95	-0.88	-1.12	-1.62	-1.23
135°	0.23	0.31	1.27	0.99	0.56	0.96	0.63	0.51	-0.16	-0.72	-1.00	-0.55
140°	0.34	0.04	0.62	0.73	0.72	1.16	0.98	1.06	1.15	1.07	0.69	0.82
145°	0.51	0.32	0.53	0.17	-0.01	0.81	0.92	1.12	0.99	0.92	0.80	1.44
150°	0.13	0.20	0.71	0.27	-0.35	0.06	0.01	0.26	0.47	0.68	0.66	1.11
155°	-0.65	-0.58	0.17	0.08	-0.25	0.09	-0.15	-0.19	-0.45	-0.60	-0.61	0.18
160°	-1.18	-1.35	-0.79	-0.90	-0.99	-0.47	-0.35	-0.10	-0.20	-0.37	-0.58	-0.34
165°	-1.03	-1.33	-1.04	-1.59	-1.84	-1.64	-1.76	-1.51	-1.38	-1.28	-1.24	-0.58
170°	-0.53	-0.76	-0.45	-1.13	-1.52	-1.51	-2.05	-2.14	-2.28	-2.50	-2.81	-2.36
175°	-0.10	-0.24	0.20	-0.34	-0.69	-0.54	-0.91	-0.94	-1.10	-1.40	-1.79	-1.59
180°	0.06	-0.05	0.47	0.03	-0.33	-0.11	-0.33	-0.28	-0.36	-0.57	-0.87	-0.60
185°	-0.08	-0.22	0.26	-0.19	-0.73	-0.58	-0.87	-0.91	-1.05	-1.34	-1.75	-1.52
190°	-0.49	-0.73	-0.34	-0.89	-1.69	-1.58	-2.03	-2.17	-2.36	-2.61	-3.03	-2.57
195°	-1.00	-1.30	-0.92	-1.51	-2.19	-1.71	-1.86	-1.65	-1.64	-1.53	-1.43	-0.75
200°	-1.18	-1.34	-0.76	-1.11	-1.24	-0.49	-0.48	-0.19	-0.30	-0.36	-0.52	-0.38
205°	-0.70	-0.61	0.13	-0.16	-0.29	0.11	-0.22	-0.22	-0.46	-0.62	-0.66	0.05
210°	0.07	0.19	0.72	0.12	-0.30	0.00	-0.03	0.19	0.40	0.61	0.61	0.95
215°	0.50	0.35	0.58	-0.03	0.01	0.74	0.86	1.16	0.89	0.80	0.77	1.45
220°	0.39	0.05	0.59	0.51	0.74	1.08	1.00	1.02	1.18	1.18	0.91	1.01
225°	0.25	0.27	1.16	0.98	0.57	1.09	0.77	0.67	-0.10	-0.59	-1.02	-0.58
230°	0.58	0.80	1.24	0.75	0.31	0.23	-0.82	-1.03	-0.91	-1.11	-1.73	-1.47
235°	0.87	0.62	0.66	0.28	-0.56	-0.85	-0.85	-0.97	-1.41	-1.10	-0.93	-0.13
240°	0.52	-0.09	0.26	-0.26	-1.21	-0.71	-0.91	-0.37	-0.13	-0.10	0.23	0.81
245°	-0.13	-0.30	0.03	-0.66	-0.89	-0.23	0.28	0.11	0.43	0.48	0.00	0.64
250°	-0.26	-0.31	-0.16	-0.67	-0.52	0.43	0.32	0.52	0.35	0.04	-0.29	0.39
255°	-0.12	-0.50	-0.09	-0.14	0.30	0.34	0.16	0.17	-0.08	0.02	0.05	0.17
260°	-0.24	-0.41	0.21	0.47	-0.22	0.26	0.17	0.06	0.13	0.08	-0.11	0.14
265°	-0.28	-0.17	0.59	0.39	-0.07	0.15	0.15	0.09	0.21	-0.06	-0.45	0.06
270°	0.02	0.03	0.63	0.15	-0.37	0.48	0.15	0.14	0.00	-0.28	-0.71	0.13
275°	0.18	0.12	0.58	-0.09	0.15	0.25	-0.02	-0.03	-0.14	-0.62	-0.29	0.17
280°	0.13	0.13	0.47	0.00	0.01	0.21	-0.08	-0.15	-0.48	-0.20	0.02	0.06
285°	0.18	0.12	0.35	0.39	-0.05	-0.06	0.05	-0.38	-0.15	0.22	-0.22	0.36
290°	0.23	0.06	0.41	0.22	-0.18	-0.14	-0.21	-0.19	0.23	0.09	-0.20	0.34
295°	0.12	0.09	0.53	0.14	-0.32	0.05	-0.06	0.04	0.24	-0.13	-0.18	0.23
300°	0.05	0.10	0.53	0.07	-0.35	-0.13	0.04	0.23	0.00	0.02	-0.37	0.27
305°	0.16	0.12	0.42	-0.05	-0.44	0.08	0.34	-0.09	0.11	-0.03	-0.32	0.27
310°	0.23	0.19	0.43	0.00	-0.20	0.06	0.08	-0.09	0.19	-0.18	-0.19	0.20
315°	0.17	0.16	0.42	-0.14	-0.38	0.02	-0.07	-0.06	0.18	-0.24	-0.30	0.15
320°	0.15	0.00	0.25	-0.26	-0.39	0.50	-0.09	0.15	0.05	-0.21	-0.15	0.33
325°	0.24	-0.06	0.13	-0.10	-0.20	0.43	-0.08	0.08	-0.05	-0.25	-0.16	0.16
330°	0.35	0.02	0.12	0.09	-0.24	0.23	0.11	0.07	-0.01	-0.22	-0.07	0.27
335°	0.38	0.13	0.17	0.16	-0.31	0.22	0.11	0.03	0.05	-0.11	-0.07	0.20
340°	0.32	0.17	0.17	0.14	-0.19	0.19	0.02	-0.11	-0.02	-0.13	-0.17	0.01
345°	0.22	0.13	0.13	0.10	-0.06	0.09	0.02	-0.13	-0.06	-0.12	-0.15	-0.05
350°	0.13	0.06	0.07	0.05	0.02	0.01	0.04	-0.09	-0.03	-0.05	-0.09	-0.02
355°	0.07	0.00	0.04	0.02	0.04	-0.02	0.06	-0.05	0.00	0.01	-0.05	0.03

**Table A.17** Influence of the analyzer's body on the directional response, measured in a plane parallel to the display and along the microphone's axis, 11200 Hz – 20000 Hz

Frequency												
Angle	11200 Hz	11800 Hz	12500 Hz	13200 Hz	14000 Hz	15000 Hz	16000 Hz	17000 Hz	18000 Hz	19000 Hz	20000 Hz	
0°	0.00	0.00	0.00	0.01	0.00	-0.01	-0.01	-0.02	-0.01	0.01	0.02	
5°	-0.01	-0.03	-0.03	0.00	-0.03	-0.01	-0.04	-0.06	-0.03	-0.04	-0.04	
10°	-0.02	-0.06	-0.08	-0.02	-0.01	-0.04	-0.07	-0.07	-0.02	-0.12	-0.08	
15°	-0.06	-0.12	-0.04	-0.09	0.12	-0.18	-0.13	0.00	0.03	-0.07	-0.05	
20°	-0.09	-0.24	0.10	-0.12	0.23	-0.45	-0.10	0.08	0.13	-0.12	0.08	
25°	-0.02	-0.37	0.11	-0.07	0.18	-0.34	-0.14	-0.01	0.14	-0.27	-0.05	
30°	0.00	-0.35	0.12	-0.27	0.27	-0.19	-0.34	-0.03	0.16	-0.32	-0.16	
35°	-0.13	-0.41	-0.02	-0.19	0.19	0.07	-0.62	-0.17	0.28	-0.15	-0.10	
40°	0.06	-0.18	-0.22	-0.14	0.14	-0.01	-0.41	-0.32	0.22	-0.14	-0.18	
45°	0.05	-0.29	-0.31	-0.11	0.00	-0.07	-0.18	-0.42	-0.03	-0.27	-0.15	
50°	0.06	-0.16	0.05	-0.36	-0.03	0.05	-0.32	-0.17	-0.12	-0.22	0.05	
55°	-0.14	-0.08	0.00	-0.32	-0.01	-0.13	-0.40	0.08	-0.09	-0.58	-0.08	
60°	-0.22	-0.28	-0.11	-0.15	-0.12	-0.22	-0.45	-0.36	0.15	-0.23	-0.19	
65°	0.09	-0.54	0.02	-0.42	0.33	-0.43	-0.61	-0.12	-0.18	-0.09	-0.19	
70°	-0.04	-0.27	0.02	-0.45	0.20	-0.21	-0.52	-0.62	0.05	-0.15	-0.16	
75°	0.06	-0.37	0.19	-0.32	-0.07	-0.17	-0.28	-0.54	-0.08	-0.38	-0.21	
80°	0.38	-0.39	-0.02	-0.20	0.06	-0.44	-0.49	-0.23	-0.03	-0.56	-0.23	
85°	-0.07	0.10	-0.23	-0.15	-0.03	-0.05	-0.91	-0.25	-0.12	-0.22	-0.33	
90°	-0.17	-0.18	0.14	-0.31	0.18	-0.39	-0.16	-0.67	0.04	-0.36	-0.33	
95°	-0.37	-0.51	0.07	-0.15	0.03	-0.15	-0.53	-0.06	-0.19	-0.22	-0.28	
100°	-0.06	-0.68	-0.48	-0.31	0.20	-0.36	-0.36	-0.49	0.02	-0.14	-0.43	
105°	0.17	-0.25	-0.15	-0.83	-0.25	-0.16	-0.47	-0.56	-0.01	-0.29	-0.15	
110°	-0.08	-0.46	0.22	-0.12	-0.33	-0.52	-0.74	-0.35	-0.14	-0.20	-0.51	
115°	-0.01	-0.36	-0.21	-0.40	0.30	-0.05	-0.94	-0.60	-0.11	-0.36	-0.62	
120°	0.55	0.67	0.38	-0.28	0.20	-0.31	-0.81	-0.37	-0.31	-0.18	-0.19	
125°	0.31	0.39	0.42	0.70	1.34	0.37	-0.19	-0.42	-0.03	-0.89	-0.96	
130°	-1.16	-1.38	-1.03	-0.20	0.38	0.23	0.80	0.93	1.36	0.69	0.50	
135°	-1.09	-1.68	-1.50	-1.74	-2.02	-2.41	-1.44	-0.70	0.30	0.97	1.00	
140°	0.13	-0.48	-0.33	-0.84	-0.76	-1.28	-1.81	-2.68	-3.22	-2.74	-2.62	
145°	1.55	1.28	1.19	0.66	1.01	0.73	0.05	-0.13	-0.18	-0.34	-1.08	
150°	0.72	0.50	0.80	0.96	1.54	1.28	1.13	1.19	1.48	1.35	1.09	
155°	0.28	0.27	0.50	0.14	0.55	-0.11	-0.22	0.35	0.93	0.86	0.56	
160°	-0.71	-1.00	-0.93	-0.93	-0.42	-0.41	-0.45	-0.01	0.08	-0.43	-0.77	
165°	-0.75	-0.73	-0.60	-0.83	-0.47	-1.04	-1.46	-1.41	-1.37	-1.52	-1.22	
170°	-2.56	-2.64	-2.21	-2.36	-1.69	-1.81	-1.73	-1.19	-0.93	-1.20	-0.64	
175°	-2.06	-2.58	-2.49	-2.87	-2.76	-3.31	-3.86	-3.77	-3.77	-4.46	-3.90	
180°	-0.98	-1.41	-1.34	-1.57	-1.45	-1.95	-2.47	-2.48	-2.69	-3.43	-3.71	
185°	-1.93	-2.52	-2.50	-2.92	-2.96	-3.49	-3.91	-3.50	-3.82	-4.67	-4.54	
190°	-2.75	-3.04	-2.70	-2.88	-2.13	-2.18	-1.87	-1.22	-0.84	-1.53	-1.00	
195°	-0.99	-1.00	-0.86	-1.01	-0.61	-1.00	-1.18	-1.02	-1.23	-2.03	-1.27	
200°	-0.83	-1.19	-1.25	-1.16	-0.54	-0.34	-0.32	0.12	0.24	-0.64	-0.54	
205°	-0.04	0.01	0.36	0.13	0.67	0.05	0.02	0.93	1.41	0.82	1.64	
210°	0.55	0.36	0.76	1.09	1.84	1.77	1.67	1.74	2.16	1.66	2.08	
215°	1.58	1.52	1.44	0.98	1.38	1.06	0.57	0.37	0.25	-0.45	-0.26	
220°	0.20	-0.29	-0.22	-0.72	-0.83	-1.16	-1.05	-1.89	-2.52	-2.59	-2.05	
225°	-1.17	-1.79	-1.76	-1.55	-1.65	-2.14	-0.94	-0.25	0.75	0.84	1.45	
230°	-1.28	-1.41	-1.11	0.07	0.88	0.34	1.17	1.54	1.96	1.01	1.44	
235°	0.22	0.54	0.37	0.72	1.60	0.86	0.68	0.58	0.77	-0.66	-0.39	
240°	0.45	0.67	0.38	-0.03	0.84	0.22	-0.29	0.36	0.04	-0.53	0.26	
245°	0.12	-0.22	-0.02	-0.09	0.50	0.17	-0.51	0.17	0.65	-0.34	0.12	
250°	0.05	-0.38	0.25	0.03	-0.01	-0.05	-0.17	0.49	0.40	-0.37	0.37	
255°	0.13	-0.06	-0.08	-0.57	0.11	0.18	0.12	0.45	0.71	-0.17	0.68	
260°	0.01	-0.52	-0.34	-0.15	0.45	0.11	0.29	0.36	0.59	-0.25	0.38	
265°	-0.32	-0.44	0.08	0.06	0.47	0.22	0.08	0.79	0.38	-0.20	0.63	
270°	-0.26	-0.02	0.31	-0.10	0.47	0.01	0.43	0.14	0.51	-0.39	0.64	
275°	0.01	0.29	-0.03	-0.10	0.25	0.26	-0.21	0.49	0.41	-0.05	0.41	
280°	0.42	-0.16	0.04	-0.11	0.35	0.08	0.02	0.58	0.42	-0.50	0.55	
285°	0.19	-0.24	0.21	-0.16	0.27	0.20	0.38	0.03	0.36	-0.15	0.44	
290°	0.11	-0.25	0.13	-0.28	0.47	0.37	-0.01	-0.01	0.54	-0.04	0.45	
295°	0.04	-0.41	0.16	-0.37	0.79	-0.12	0.08	0.36	0.24	0.16	0.47	
300°	-0.13	-0.16	-0.08	0.05	0.14	0.22	0.04	0.29	0.58	-0.02	0.29	
305°	0.01	0.01	0.11	-0.11	0.16	0.31	0.07	0.50	0.27	-0.34	0.44	
310°	0.13	-0.08	0.21	-0.31	0.37	0.34	0.07	0.34	0.22	-0.06	0.41	
315°	-0.02	-0.17	-0.20	0.00	0.27	0.34	0.14	-0.04	0.32	-0.05	0.24	
320°	0.18	-0.04	-0.17	0.04	0.27	0.30	-0.02	-0.04	0.54	0.00	0.09	
325°	-0.02	-0.34	0.10	-0.06	0.38	0.28	-0.30	0.05	0.52	0.04	0.19	
330°	0.11	-0.29	0.25	-0.25	0.50	0.07	-0.14	0.21	0.44	-0.14	0.09	
335°	0.04	-0.31	0.25	0.00	0.30	-0.12	0.02	0.20	0.42	-0.13	0.09	
340°	-0.05	-0.20	0.17	-0.02	0.33	-0.28	0.04	0.17	0.31	0.01	0.21	
345°	-0.05	-0.03	0.00	0.00	0.18	-0.06	0.03	0.05	0.18	0.05	0.07	
350°	-0.05	0.05	-0.06	0.03	0.03	0.04	0.06	0.02	0.03	-0.05	0.00	
355°	-0.04	0.06	-0.03	0.02	0.00	0.03	0.07	-0.02	-0.02	-0.01	-0.01	

**Microphone Type 4966 for Hand-held Analyzer Types 2250, 2250-L and 2270 –  
Supplement to Instruction Manual BE 1712**

**Table A.18 Influence of the analyzer's body on the directional response, measured in a plane perpendicular to the display and along the microphone's axis, 500 Hz – 3550 Hz**

Frequency												
Angle	500 Hz	630 Hz	800 Hz	1000 Hz	1250 Hz	1600 Hz	2000 Hz	2240 Hz	2500 Hz	2800 Hz	3150 Hz	3550 Hz
0°	0.02	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5°	0.00	-0.01	0.00	0.01	0.00	0.00	-0.01	0.00	-0.02	0.00	-0.01	-0.01
10°	-0.01	0.01	-0.01	0.02	0.00	0.00	-0.02	0.02	-0.04	0.03	-0.04	-0.01
15°	-0.01	0.02	-0.01	0.03	-0.02	0.00	-0.05	0.04	-0.08	0.07	-0.08	-0.01
20°	-0.02	0.03	-0.01	0.03	-0.02	-0.01	-0.09	0.08	-0.14	0.12	-0.15	0.03
25°	-0.03	0.02	-0.01	0.04	-0.03	-0.02	-0.14	0.12	-0.20	0.16	-0.22	0.09
30°	-0.01	0.06	-0.02	0.04	-0.01	-0.04	-0.19	0.14	-0.21	0.17	-0.25	0.19
35°	-0.02	0.06	-0.01	0.04	0.01	-0.10	-0.23	0.13	-0.16	0.10	-0.22	0.21
40°	-0.05	0.11	0.02	0.05	0.05	-0.18	-0.22	0.05	-0.05	-0.03	-0.10	0.12
45°	-0.03	0.13	0.04	0.03	0.11	-0.29	-0.16	-0.06	0.07	-0.19	0.02	-0.06
50°	-0.05	0.16	0.09	0.01	0.17	-0.39	-0.07	-0.16	0.11	-0.20	0.01	-0.14
55°	-0.07	0.18	0.14	-0.01	0.22	-0.45	0.01	-0.16	0.00	-0.01	-0.20	0.02
60°	-0.12	0.19	0.21	0.00	0.23	-0.43	-0.01	-0.05	-0.18	0.20	-0.42	0.20
65°	-0.10	0.19	0.27	0.03	0.22	-0.35	-0.13	0.07	-0.26	0.19	-0.32	0.07
70°	-0.12	0.18	0.33	0.08	0.19	-0.22	-0.32	0.08	-0.13	-0.06	-0.01	-0.25
75°	-0.15	0.15	0.36	0.18	0.16	-0.10	-0.47	-0.09	0.03	-0.21	0.02	-0.15
80°	-0.18	0.13	0.38	0.28	0.16	-0.05	-0.44	-0.34	-0.02	-0.03	-0.27	0.22
85°	-0.21	0.08	0.37	0.39	0.23	-0.06	-0.27	-0.44	-0.31	0.14	-0.32	0.10
90°	-0.23	0.03	0.34	0.47	0.34	-0.11	-0.09	-0.29	-0.56	-0.11	-0.05	-0.22
95°	-0.31	-0.01	0.29	0.50	0.50	-0.12	-0.02	-0.02	-0.45	-0.56	-0.13	0.08
100°	-0.32	-0.08	0.22	0.49	0.66	-0.03	-0.05	0.10	-0.12	-0.53	-0.69	0.17
105°	-0.33	-0.15	0.15	0.42	0.76	0.15	-0.06	0.04	0.07	-0.05	-0.81	-0.48
110°	-0.36	-0.20	0.06	0.30	0.78	0.35	0.07	-0.01	-0.01	0.20	-0.22	-0.70
115°	-0.41	-0.23	-0.02	0.15	0.70	0.48	0.34	0.17	-0.08	0.03	0.12	0.03
120°	-0.40	-0.27	-0.09	-0.01	0.53	0.47	0.59	0.52	0.17	-0.06	-0.10	0.35
125°	-0.38	-0.29	-0.12	-0.15	0.30	0.33	0.67	0.80	0.61	0.34	-0.18	0.03
130°	-0.39	-0.30	-0.14	-0.25	0.07	0.05	0.51	0.81	0.87	0.89	0.37	0.17
135°	-0.38	-0.28	-0.13	-0.30	-0.11	-0.25	0.14	0.50	0.75	1.04	0.94	0.95
140°	-0.32	-0.28	-0.09	-0.29	-0.22	-0.51	-0.30	-0.01	0.24	0.65	0.89	1.34
145°	-0.32	-0.25	-0.06	-0.24	-0.23	-0.64	-0.65	-0.51	-0.42	-0.12	0.17	0.84
150°	-0.27	-0.23	0.00	-0.17	-0.17	-0.63	-0.79	-0.79	-0.91	-0.85	-0.85	-0.29
155°	-0.25	-0.20	0.04	-0.08	-0.07	-0.53	-0.70	-0.77	-1.01	-1.14	-1.48	-1.30
160°	-0.23	-0.16	0.10	0.00	0.04	-0.38	-0.50	-0.55	-0.78	-0.94	-1.39	-1.46
165°	-0.20	-0.13	0.13	0.07	0.14	-0.23	-0.28	-0.28	-0.44	-0.53	-0.90	-0.94
170°	-0.20	-0.12	0.17	0.13	0.22	-0.11	-0.10	-0.05	-0.15	-0.15	-0.41	-0.35
175°	-0.17	-0.11	0.19	0.17	0.27	-0.03	0.01	0.10	0.04	0.09	-0.10	0.04
180°	-0.17	-0.10	0.19	0.17	0.28	-0.01	0.05	0.14	0.10	0.16	0.01	0.18
185°	-0.18	-0.11	0.19	0.17	0.28	-0.03	0.01	0.10	0.04	0.09	-0.09	0.05
190°	-0.19	-0.12	0.17	0.14	0.23	-0.11	-0.10	-0.04	-0.15	-0.15	-0.40	-0.34
195°	-0.23	-0.12	0.15	0.09	0.16	-0.22	-0.28	-0.27	-0.44	-0.53	-0.88	-0.93
200°	-0.23	-0.16	0.11	0.02	0.06	-0.38	-0.50	-0.55	-0.78	-0.95	-1.38	-1.46
205°	-0.26	-0.19	0.06	-0.07	-0.05	-0.54	-0.71	-0.78	-1.02	-1.18	-1.50	-1.32
210°	-0.29	-0.20	0.00	-0.16	-0.15	-0.66	-0.81	-0.81	-0.95	-0.91	-0.89	-0.31
215°	-0.31	-0.23	-0.04	-0.24	-0.21	-0.68	-0.68	-0.55	-0.47	-0.15	0.13	0.83
220°	-0.34	-0.26	-0.09	-0.30	-0.21	-0.56	-0.34	-0.03	0.22	0.67	0.90	1.36
225°	-0.39	-0.27	-0.13	-0.30	-0.11	-0.31	0.12	0.51	0.76	1.10	1.01	1.01
230°	-0.39	-0.28	-0.14	-0.26	0.06	0.01	0.51	0.84	0.92	0.96	0.47	0.25
235°	-0.42	-0.28	-0.13	-0.16	0.28	0.30	0.70	0.85	0.68	0.42	-0.12	0.08
240°	-0.42	-0.26	-0.10	-0.02	0.51	0.48	0.64	0.58	0.24	0.01	-0.09	0.36
245°	-0.42	-0.23	-0.03	0.15	0.70	0.52	0.41	0.23	-0.01	0.08	0.13	0.05
250°	-0.40	-0.19	0.05	0.32	0.79	0.41	0.14	0.06	0.04	0.22	-0.18	-0.66
255°	-0.38	-0.18	0.13	0.44	0.78	0.21	-0.01	0.11	0.11	-0.03	-0.77	-0.47
260°	-0.35	-0.09	0.23	0.51	0.69	0.03	0.00	0.17	-0.08	-0.49	-0.67	0.17
265°	-0.33	-0.02	0.31	0.53	0.55	-0.06	0.04	0.04	-0.43	-0.53	-0.10	0.10
270°	-0.29	0.04	0.37	0.49	0.39	-0.06	-0.01	-0.25	-0.54	-0.10	-0.01	-0.18
275°	-0.25	0.07	0.40	0.42	0.27	-0.02	-0.19	-0.43	-0.28	0.16	-0.31	0.13
280°	-0.23	0.13	0.41	0.31	0.21	-0.01	-0.38	-0.34	0.03	0.00	-0.27	0.30
285°	-0.19	0.15	0.40	0.21	0.20	-0.06	-0.43	-0.07	0.07	-0.20	0.07	-0.01
290°	-0.19	0.20	0.36	0.12	0.23	-0.17	-0.31	0.13	-0.11	-0.06	0.09	-0.11
295°	-0.12	0.18	0.31	0.06	0.25	-0.30	-0.12	0.13	-0.26	0.22	-0.19	0.14
300°	-0.14	0.21	0.25	0.01	0.27	-0.38	0.01	0.00	-0.17	0.27	-0.29	0.20
305°	-0.07	0.19	0.19	0.00	0.25	-0.40	0.04	-0.13	0.03	0.09	-0.13	0.02
310°	-0.09	0.19	0.13	0.02	0.20	-0.34	-0.03	-0.15	0.16	-0.07	0.03	-0.12
315°	-0.06	0.16	0.08	0.04	0.14	-0.24	-0.13	-0.06	0.14	-0.07	0.01	-0.02
320°	-0.08	0.15	0.05	0.04	0.08	-0.14	-0.19	0.06	0.03	0.04	-0.10	0.15
325°	-0.07	0.12	0.03	0.06	0.04	-0.06	-0.21	0.14	-0.08	0.16	-0.21	0.24
330°	-0.03	0.08	0.01	0.05	0.01	-0.02	-0.18	0.16	-0.12	0.20	-0.23	0.22
335°	-0.05	0.06	0.02	0.03	0.00	0.01	-0.14	0.15	-0.12	0.18	-0.18	0.14
340°	-0.04	0.05	0.01	0.02	-0.01	0.03	-0.09	0.11	-0.08	0.13	-0.12	0.07
345°	-0.03	0.03	0.01	0.00	-0.01	0.02	-0.05	0.08	-0.04	0.09	-0.07	0.02
350°	-0.02	0.04	0.01	0.00	0.00	0.02	-0.02	0.04	0.00	0.04	-0.03	0.00
355°	-0.04	0.02	0.00	0.00	0.00	0.01	0.00	0.02	0.02	0.03	-0.01	0.00

**Table A.19** Influence of the analyzer's body on the directional response, measured in a plane perpendicular to the display and along the microphone's axis, 4000 Hz – 10600 Hz

Frequency												
Angle	4000 Hz	4500 Hz	5000 Hz	5600 Hz	6300 Hz	7100 Hz	8000 Hz	8500 Hz	9000 Hz	9500 Hz	10000 Hz	10600 Hz
0°	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	-0.01	0.00	0.00	-0.01	0.00
5°	0.02	0.02	0.03	-0.01	-0.03	0.00	-0.02	-0.03	0.01	-0.05	-0.02	-0.03
10°	0.07	0.08	0.06	0.04	-0.08	0.06	-0.04	-0.06	0.04	-0.09	-0.08	-0.06
15°	0.15	0.15	0.11	0.16	-0.17	0.15	-0.07	-0.08	0.09	-0.18	-0.17	-0.11
20°	0.22	0.17	0.14	0.30	-0.28	0.23	-0.07	-0.08	0.18	-0.22	-0.10	-0.05
25°	0.26	0.11	0.10	0.39	-0.32	0.19	0.03	-0.11	0.18	-0.28	0.06	0.04
30°	0.21	-0.07	0.02	0.26	-0.21	0.06	0.12	-0.16	0.05	-0.29	-0.03	-0.03
35°	0.05	-0.17	0.06	-0.03	-0.26	0.21	-0.12	-0.01	0.01	-0.10	-0.27	0.12
40°	-0.05	0.00	0.36	-0.05	-0.54	0.27	-0.23	0.18	-0.07	-0.13	-0.44	0.25
45°	0.06	0.27	0.53	0.11	-0.40	-0.12	0.08	-0.07	0.26	-0.31	-0.19	0.07
50°	0.28	0.21	0.27	-0.08	-0.28	0.12	-0.21	-0.01	0.37	-0.46	-0.20	-0.04
55°	0.24	-0.08	0.29	0.01	-0.66	0.06	0.21	-0.03	0.09	0.02	-0.49	0.19
60°	-0.03	0.00	0.64	0.29	-0.42	-0.07	-0.29	0.01	0.36	-0.31	-0.13	0.14
65°	-0.02	0.27	0.43	0.07	-0.45	-0.12	0.13	-0.25	0.08	0.19	-0.45	0.22
70°	0.22	0.00	0.28	0.52	-0.25	-0.20	-0.39	0.07	0.05	-0.17	-0.07	0.03
75°	0.04	-0.09	0.62	0.40	-0.33	-0.05	-0.10	-0.56	0.27	-0.26	-0.31	0.27
80°	-0.31	0.20	0.42	0.13	0.14	0.04	-0.03	-0.27	-0.42	0.07	-0.40	-0.08
85°	0.00	-0.22	0.53	0.25	-0.12	0.17	-0.21	0.11	-0.29	-0.39	-0.23	-0.16
90°	0.24	-0.35	0.56	0.10	-0.15	0.46	-0.11	-0.12	0.38	-0.69	-0.26	-0.37
95°	-0.15	0.23	-0.03	0.50	-0.42	0.21	0.27	-0.04	0.19	-0.17	-0.45	-0.13
100°	-0.03	-0.17	0.52	0.10	-0.17	0.22	0.04	0.18	0.20	0.06	-0.27	0.16
105°	0.22	-0.19	0.39	0.21	-0.45	0.01	0.12	0.17	0.22	0.17	-0.10	0.51
110°	-0.50	0.11	0.17	0.16	-0.07	-0.15	-0.17	-0.11	0.36	-0.06	0.01	0.42
115°	-0.72	-0.74	0.58	-0.09	-0.38	0.35	-0.33	-0.09	-0.19	-0.25	-0.01	0.16
120°	0.19	-0.69	-0.49	0.40	-0.50	-0.07	0.20	-0.17	-0.08	-0.09	-0.75	-0.15
125°	0.38	0.32	-0.03	-0.78	-0.53	0.06	-0.44	0.14	0.42	-0.20	-0.17	0.16
130°	-0.05	0.18	1.01	0.28	-1.12	-0.80	-0.32	-0.42	-0.46	-0.29	0.03	0.48
135°	0.44	-0.05	0.45	0.74	0.42	0.08	-1.24	-0.90	-0.48	-0.63	-1.07	-0.52
140°	1.31	0.87	0.73	0.11	-0.13	0.99	0.67	0.21	-0.22	-0.84	-1.08	-0.78
145°	1.30	1.41	1.90	1.35	0.05	0.07	0.22	0.69	1.03	0.99	0.84	0.93
150°	0.26	0.70	1.77	2.04	1.52	1.55	0.59	0.31	0.12	-0.14	0.02	0.92
155°	-1.16	-0.90	0.14	0.75	1.00	1.87	1.90	1.96	1.94	1.47	1.00	1.15
160°	-1.76	-2.05	-1.69	-1.71	-1.44	-0.36	0.22	0.77	1.22	1.38	1.52	2.14
165°	-1.28	-1.75	-1.74	-2.64	-3.28	-2.91	-3.24	-2.94	-2.63	-2.50	-2.23	-1.36
170°	-0.53	-0.86	-0.64	-1.41	-2.29	-2.16	-3.05	-3.38	-3.65	-4.27	-4.85	-4.80
175°	-0.01	-0.21	0.21	-0.25	-0.95	-0.67	-1.12	-1.23	-1.27	-1.65	-2.05	-1.92
180°	0.16	0.00	0.50	0.19	-0.42	-0.13	-0.44	-0.44	-0.38	-0.66	-0.91	-0.65
185°	-0.01	-0.21	0.24	-0.06	-0.77	-0.64	-1.12	-1.17	-1.21	-1.57	-1.89	-1.75
190°	-0.53	-0.84	-0.53	-1.00	-1.97	-2.24	-3.04	-3.31	-3.51	-4.01	-4.71	-4.61
195°	-1.28	-1.69	-1.53	-2.21	-3.22	-3.45	-3.44	-3.16	-2.86	-2.84	-2.60	-1.75
200°	-1.80	-2.02	-1.55	-1.80	-2.01	-0.82	0.01	0.66	1.07	1.24	1.33	2.02
205°	-1.23	-0.94	0.14	0.35	0.45	1.80	1.88	2.15	2.13	1.59	1.11	1.26
210°	0.21	0.68	1.73	1.64	1.30	1.81	0.80	0.56	0.18	-0.28	-0.13	0.79
215°	1.31	1.45	1.89	1.08	0.17	0.26	0.23	0.64	0.84	0.88	0.82	0.80
220°	1.39	0.95	0.78	0.06	-0.06	0.87	0.53	0.23	-0.22	-0.85	-1.09	-1.05
225°	0.54	-0.01	0.45	0.77	0.43	0.02	-1.08	-0.79	-0.55	-0.77	-1.61	-1.00
230°	0.00	0.17	0.89	0.47	-1.03	-0.73	-0.56	-0.72	-0.88	-0.56	0.04	0.60
235°	0.40	0.30	0.00	-0.62	-0.76	-0.15	-0.53	0.35	0.65	0.02	-0.15	0.50
240°	0.23	-0.68	-0.41	0.23	-0.70	-0.10	0.41	-0.01	0.08	0.31	-0.57	-0.38
245°	-0.68	-0.76	0.60	-0.35	-0.57	0.70	-0.21	0.26	-0.04	-0.67	-0.27	0.21
250°	-0.49	0.12	0.08	0.01	0.25	-0.07	-0.05	-0.33	0.28	0.00	0.10	0.73
255°	0.24	-0.22	0.32	0.46	-0.27	0.10	-0.05	0.41	0.48	0.42	-0.21	0.73
260°	-0.01	-0.22	0.61	0.33	-0.24	0.02	0.34	0.44	0.33	0.12	-0.10	0.27
265°	-0.15	0.29	0.17	0.43	-0.64	0.52	0.31	0.16	0.37	0.02	-0.38	-0.02
270°	0.29	-0.15	0.65	-0.14	-0.10	0.58	0.08	0.07	0.64	-0.52	-0.28	-0.31
275°	0.11	-0.09	0.42	0.22	0.11	0.16	-0.09	0.42	-0.19	-0.35	-0.34	-0.18
280°	-0.18	0.21	0.34	0.40	0.16	0.23	0.17	-0.11	-0.35	0.10	-0.47	0.43
285°	0.12	-0.12	0.61	0.57	-0.40	0.03	-0.04	-0.40	0.37	-0.18	0.08	0.55
290°	0.22	-0.01	0.47	0.37	-0.09	-0.01	-0.27	0.20	0.19	0.20	0.01	-0.02
295°	-0.02	0.30	0.62	-0.07	-0.27	-0.11	0.15	-0.03	0.49	0.32	-0.59	0.28
300°	0.02	0.12	0.67	0.32	-0.33	0.08	-0.12	0.40	0.56	-0.45	-0.04	0.39
305°	0.29	0.07	0.27	0.29	-0.70	0.02	0.53	0.25	-0.03	0.24	-0.49	0.42
310°	0.35	0.34	0.25	0.14	-0.27	0.01	0.06	-0.04	0.47	-0.35	-0.07	0.09
315°	0.17	0.33	0.54	0.04	-0.31	0.09	0.20	-0.16	0.51	-0.22	0.00	0.10
320°	0.07	0.02	0.43	-0.22	-0.37	0.66	-0.35	0.47	0.13	-0.09	-0.51	0.32
325°	0.15	-0.17	0.21	-0.11	-0.19	0.47	-0.24	0.22	0.20	0.07	-0.30	0.22
330°	0.28	-0.06	0.14	0.28	-0.34	0.22	0.33	0.01	0.12	-0.32	0.05	0.08
335°	0.32	0.12	0.18	0.48	-0.54	0.29	0.28	0.12	0.33	-0.41	0.09	0.20
340°	0.27	0.19	0.18	0.41	-0.42	0.30	0.02	0.06	0.35	-0.21	-0.07	0.18
345°	0.19	0.16	0.14	0.26	-0.18	0.16	-0.05	-0.06	0.16	-0.06	-0.18	0.10
350°	0.11	0.08	0.08	0.12	-0.03	0.03	0.00	-0.07	0.03	0.02	-0.14	0.08
355°	0.07	0.02	0.05	0.04	0.03	-0.02	0.06	-0.04	0.01	0.05	-0.06	0.07

**Microphone Type 4966 for Hand-held Analyzer Types 2250, 2250-L and 2270 –  
Supplement to Instruction Manual BE 1712**

**Table A.20 Influence of the analyzer's body on the directional response, measured in a plane perpendicular to the display and along the microphone's axis, 11200 Hz – 20000 Hz**

Frequency		11200 Hz	11800 Hz	12500 Hz	13200 Hz	14000 Hz	15000 Hz	16000 Hz	17000 Hz	18000 Hz	19000 Hz	20000 Hz
Angle												
0°	0.00	0.00	0.00	0.00	0.00	0.01	0.00	-0.01	-0.03	0.00	0.00	0.00
5°	0.00	-0.04	-0.03	-0.01	-0.02	0.02	-0.02	-0.07	-0.02	-0.06	-0.06	-0.06
10°	0.05	-0.07	-0.11	0.01	-0.04	-0.03	-0.08	-0.05	-0.04	-0.05	-0.05	-0.03
15°	0.11	-0.08	-0.17	0.08	0.00	-0.21	-0.15	-0.14	0.06	-0.09	0.01	0.01
20°	0.09	-0.08	-0.04	0.05	0.13	-0.37	-0.30	-0.04	-0.02	-0.15	0.01	0.01
25°	-0.04	-0.28	0.00	-0.02	0.01	-0.34	-0.26	-0.06	0.16	-0.28	0.03	0.03
30°	0.00	-0.32	-0.18	-0.19	0.18	-0.21	-0.41	-0.17	0.06	-0.46	-0.14	-0.14
35°	0.01	-0.30	0.06	-0.27	0.17	-0.13	-0.60	-0.48	0.14	-0.34	-0.19	-0.19
40°	-0.13	-0.30	-0.34	-0.49	0.30	-0.15	-0.58	-0.43	0.11	-0.28	-0.37	-0.37
45°	0.11	-0.23	-0.20	-0.14	0.05	-0.27	-0.38	-0.42	-0.18	-0.38	-0.30	-0.30
50°	0.10	-0.37	0.02	-0.47	-0.21	0.04	-0.45	-0.42	-0.49	-0.37	-0.10	-0.10
55°	-0.36	-0.19	-0.35	-0.44	-0.19	-0.25	-0.59	0.07	-0.44	-0.76	-0.26	-0.26
60°	0.00	-0.30	-0.13	-0.35	-0.13	-0.28	-0.71	-0.53	-0.16	-0.53	-0.42	-0.42
65°	-0.02	-0.39	0.12	-0.51	0.22	-0.51	-0.77	-0.69	-0.37	-0.27	-0.62	-0.62
70°	-0.03	-0.44	0.05	-0.51	0.15	-0.55	-0.70	-0.77	-0.62	-0.37	-0.41	-0.41
75°	-0.16	-0.46	-0.04	-0.30	-0.10	-0.43	-0.84	-0.83	-0.50	-0.87	-0.44	-0.44
80°	0.41	-0.66	-0.10	-0.34	0.08	-0.62	-0.93	-0.69	-0.29	-0.88	-0.75	-0.75
85°	-0.01	-0.05	-0.46	-0.27	0.07	-0.24	-1.19	-0.47	-0.42	-0.48	-0.63	-0.63
90°	-0.05	-0.42	-0.20	-0.53	0.03	-0.61	-0.68	-1.09	-0.32	-0.52	-1.02	-1.02
95°	-0.26	-0.69	-0.30	-0.45	-0.03	-0.52	-1.14	-0.29	-0.78	-0.79	-0.95	-0.95
100°	-0.44	-0.30	-1.07	-0.39	0.08	-0.67	-0.85	-0.36	-0.71	-0.53	-0.96	-0.96
105°	-0.33	-0.12	-0.78	-0.55	-0.73	-0.41	-1.07	-0.86	-0.64	-0.43	-0.78	-0.78
110°	-0.09	0.07	-0.37	-0.15	-0.81	-0.53	-1.59	-0.47	-0.89	-0.61	-1.10	-1.10
115°	0.12	-0.16	-0.31	0.38	0.00	-0.47	-1.87	-0.28	-0.98	-1.08	-1.19	-1.19
120°	0.17	-0.39	-0.07	-0.04	-0.15	0.16	-0.73	-0.38	-1.19	-0.61	-1.85	-1.85
125°	-0.29	-1.07	-0.13	-0.14	-0.31	-0.21	-0.74	-0.63	0.62	0.12	-0.51	-0.51
130°	-0.06	-0.37	0.06	-0.76	-1.05	-0.52	-0.75	-0.98	0.24	-0.73	-0.77	-0.77
135°	-0.37	-0.06	0.00	-0.71	0.03	-0.21	-1.05	-1.83	-0.43	-0.67	-1.57	-1.57
140°	-0.98	-1.38	-1.39	-1.30	0.19	-0.12	-1.02	-1.43	0.18	0.01	-1.57	-1.57
145°	0.15	-0.95	-1.11	-1.60	-0.86	-1.46	-2.60	-1.70	-0.44	-0.31	-1.97	-1.97
150°	1.15	1.29	1.31	0.76	0.42	-0.60	-1.24	-0.50	-0.22	-1.54	-2.68	-2.68
155°	0.63	0.01	0.09	0.13	0.95	0.87	1.09	1.56	1.20	0.17	-0.42	-0.42
160°	2.06	2.02	2.01	1.67	1.69	0.78	-0.01	0.08	0.48	0.69	0.98	0.98
165°	-1.07	-0.64	0.13	0.56	1.47	1.25	1.10	1.84	1.81	1.66	1.43	1.43
170°	-5.41	-6.19	-6.20	-6.14	-5.17	-5.02	-5.03	-4.99	-3.65	-2.89	-2.11	-2.11
175°	-2.32	-2.93	-3.29	-3.99	-3.95	-4.71	-5.19	-5.14	-5.58	-7.31	-7.34	-7.34
180°	-0.88	-1.22	-1.29	-1.69	-1.64	-2.21	-2.44	-2.00	-2.17	-2.86	-3.13	-3.13
185°	-2.08	-2.60	-2.78	-3.39	-3.60	-4.43	-4.65	-4.83	-5.40	-6.13	-7.23	-7.23
190°	-5.22	-5.94	-6.07	-6.22	-5.95	-5.70	-5.51	-4.28	-3.77	-4.36	-2.99	-2.99
195°	-1.42	-0.97	-0.20	-0.01	0.85	0.78	0.79	1.31	1.67	0.96	1.22	1.22
200°	2.06	1.97	2.03	1.45	1.44	0.57	-0.07	0.20	0.65	0.29	1.50	1.50
205°	0.70	0.05	-0.22	-0.32	0.55	0.89	1.32	1.86	2.01	0.52	0.36	0.36
210°	0.89	1.01	0.93	0.44	0.38	-0.28	-0.28	0.75	0.92	-0.31	-1.71	-1.71
215°	-0.04	-0.96	-1.43	-1.20	-0.16	-0.58	-1.57	-0.46	0.24	-0.56	-0.83	-0.83
220°	-1.11	-1.70	-1.60	-0.88	0.89	0.77	0.11	0.11	1.34	0.50	-0.60	-0.60
225°	-0.53	0.29	0.60	0.12	0.89	0.73	-0.03	-0.36	0.23	-1.28	-1.28	-1.28
230°	0.37	0.18	0.61	0.17	-0.46	-0.31	-0.46	-0.21	1.26	-0.05	0.88	0.88
235°	0.23	-0.74	-0.21	-0.30	-0.49	0.45	0.69	1.30	1.49	0.00	0.56	0.56
240°	0.00	-0.42	-0.20	0.57	0.85	1.37	0.70	0.54	-0.84	-0.80	-0.93	-0.93
245°	0.21	0.29	-0.08	1.52	0.86	0.26	-1.06	0.24	-0.11	-0.45	0.28	0.28
250°	-0.01	0.60	0.34	0.59	-0.53	-0.07	-0.50	0.16	0.27	-0.21	0.18	0.18
255°	-0.01	0.28	-0.12	-0.23	-0.16	0.20	0.20	0.25	0.20	0.10	0.32	0.32
260°	-0.15	0.04	-0.88	-0.11	0.98	0.55	0.05	0.40	0.01	-0.03	0.41	0.41
265°	-0.07	-0.50	-0.07	0.44	0.89	0.05	-0.20	0.63	0.66	-0.45	0.01	0.01
270°	0.02	0.07	0.67	-0.01	0.18	0.21	0.49	-0.12	0.19	-0.17	0.42	0.42
275°	0.57	0.51	-0.08	-0.17	0.76	0.68	-0.33	-0.08	0.53	0.21	0.09	0.09
280°	0.78	-0.46	-0.01	0.36	0.85	-0.21	-0.11	0.19	0.56	-0.54	0.42	0.42
285°	-0.11	-0.28	0.58	0.30	0.02	0.27	0.25	-0.04	0.19	-0.10	0.25	0.25
290°	0.07	0.08	0.57	-0.54	0.79	0.27	-0.01	0.00	0.38	0.12	0.12	0.12
295°	0.37	0.15	0.14	-0.10	0.96	-0.25	0.04	0.21	0.47	0.32	0.08	0.08
300°	0.41	-0.13	0.13	0.35	0.09	0.27	0.11	0.25	0.49	-0.02	0.12	0.12
305°	-0.25	-0.08	0.20	-0.11	-0.04	0.62	0.01	0.44	0.42	-0.38	0.44	0.44
310°	0.13	0.00	0.53	-0.61	0.60	0.32	0.03	0.38	0.25	0.00	0.37	0.37
315°	0.23	0.21	-0.13	0.12	0.49	0.19	0.20	-0.12	0.34	0.06	0.29	0.29
320°	0.14	0.08	-0.46	0.16	0.35	0.33	0.06	0.00	0.69	0.00	0.06	0.06
325°	0.33	-0.25	0.29	0.06	0.23	0.47	-0.29	-0.04	0.51	0.11	0.15	0.15
330°	0.32	-0.39	0.27	-0.17	0.46	0.17	-0.17	0.35	0.35	-0.07	0.11	0.11
335°	0.03	-0.28	0.46	-0.23	0.56	-0.16	0.09	0.21	0.49	-0.01	0.25	0.25
340°	0.03	0.10	0.32	-0.18	0.59	-0.35	0.09	0.06	0.20	0.00	0.28	0.28
345°	0.08	0.07	0.09	-0.06	0.31	-0.21	0.18	-0.02	0.23	0.07	0.21	0.21
350°	0.02	0.01	0.01	-0.01	0.08	-0.04	0.17	0.08	0.15	0.07	0.14	0.14
355°	-0.02	0.04	0.00	0.02	0.01	0.01	0.09	0.07	0.03	0.06	0.09	0.09

**Table A.21** Directional response for Microphone Type 4966, Microphone Preamplifier ZC-0032 and the analyzer with the microphone preamplifier mounted directly on the analyzer, measured in a plane parallel to the display and along the microphone's axis, 500 Hz – 3550 Hz

Frequency												
Angle	500 Hz	630 Hz	800 Hz	1000 Hz	1250 Hz	1600 Hz	2000 Hz	2240 Hz	2500 Hz	2800 Hz	3150 Hz	3550 Hz
0°	0.01	0.01	-0.01	0.00	0.00	0.00	0.01	0.00	-0.01	-0.01	0.00	0.00
5°	0.00	0.01	0.00	0.00	0.00	0.00	-0.01	0.01	-0.04	-0.01	-0.02	-0.01
10°	0.00	0.00	-0.01	0.00	0.00	0.00	-0.05	0.02	-0.07	0.00	-0.07	-0.04
15°	-0.01	-0.01	-0.02	0.01	-0.01	-0.02	-0.09	0.04	-0.13	0.05	-0.14	-0.05
20°	-0.01	0.01	-0.01	0.00	-0.01	-0.03	-0.15	0.08	-0.18	0.09	-0.23	-0.02
25°	0.00	0.03	-0.01	0.00	-0.02	-0.07	-0.24	0.08	-0.24	0.09	-0.35	0.03
30°	-0.01	0.02	-0.01	-0.01	0.00	-0.12	-0.29	0.06	-0.25	0.05	-0.42	0.09
35°	0.00	0.04	0.01	-0.01	0.03	-0.21	-0.33	-0.03	-0.20	-0.07	-0.43	0.09
40°	-0.01	0.06	0.03	-0.03	0.05	-0.32	-0.32	-0.19	-0.12	-0.24	-0.38	-0.04
45°	-0.02	0.09	0.07	-0.04	0.09	-0.46	-0.27	-0.37	-0.07	-0.40	-0.36	-0.23
50°	-0.03	0.12	0.11	-0.07	0.14	-0.57	-0.20	-0.50	-0.12	-0.45	-0.44	-0.34
55°	-0.07	0.12	0.16	-0.08	0.16	-0.63	-0.17	-0.50	-0.31	-0.36	-0.60	-0.31
60°	-0.08	0.12	0.21	-0.08	0.17	-0.61	-0.22	-0.38	-0.55	-0.31	-0.74	-0.32
65°	-0.10	0.10	0.25	-0.06	0.16	-0.51	-0.38	-0.26	-0.65	-0.41	-0.71	-0.47
70°	-0.14	0.10	0.30	-0.01	0.14	-0.38	-0.59	-0.28	-0.53	-0.67	-0.65	-0.62
75°	-0.16	0.06	0.31	0.06	0.11	-0.25	-0.70	-0.48	-0.35	-0.82	-0.78	-0.58
80°	-0.19	0.01	0.32	0.14	0.11	-0.19	-0.65	-0.75	-0.39	-0.72	-1.07	-0.59
85°	-0.22	-0.01	0.30	0.22	0.13	-0.22	-0.45	-0.87	-0.71	-0.62	-1.17	-0.86
90°	-0.24	-0.05	0.25	0.28	0.20	-0.29	-0.25	-0.69	-0.99	-0.79	-1.03	-1.10
95°	-0.28	-0.12	0.19	0.30	0.30	-0.35	-0.16	-0.39	-0.90	-1.16	-1.10	-1.02
100°	-0.29	-0.16	0.11	0.28	0.41	-0.30	-0.19	-0.18	-0.48	-1.16	-1.43	-0.97
105°	-0.34	-0.22	0.02	0.21	0.47	-0.20	-0.31	-0.22	-0.19	-0.73	-1.49	-1.27
110°	-0.35	-0.26	-0.06	0.11	0.45	-0.11	-0.40	-0.44	-0.25	-0.38	-1.05	-1.36
115°	-0.36	-0.30	-0.12	-0.03	0.37	-0.04	-0.31	-0.54	-0.48	-0.40	-0.63	-0.83
120°	-0.36	-0.33	-0.17	-0.18	0.23	-0.06	-0.15	-0.43	-0.59	-0.67	-0.66	-0.37
125°	-0.35	-0.33	-0.21	-0.30	0.04	-0.18	-0.04	-0.21	-0.44	-0.77	-0.97	-0.49
130°	-0.35	-0.34	-0.21	-0.39	-0.13	-0.38	-0.08	-0.20	-0.53	-1.03	-0.85	
135°	-0.33	-0.34	-0.19	-0.43	-0.29	-0.65	-0.36	-0.25	-0.21	-0.35	-0.80	-0.84
140°	-0.29	-0.30	-0.15	-0.40	-0.39	-0.88	-0.73	-0.65	-0.52	-0.51	-0.72	-0.60
145°	-0.29	-0.28	-0.10	-0.34	-0.39	-0.95	-1.00	-1.03	-0.94	-0.92	-1.01	-0.66
150°	-0.22	-0.25	-0.05	-0.26	-0.30	-0.87	-1.07	-1.22	-1.26	-1.39	-1.57	-1.18
155°	-0.22	-0.22	0.01	-0.16	-0.20	-0.73	-0.98	-1.19	-1.34	-1.61	-1.97	-1.76
160°	-0.19	-0.18	0.06	-0.07	-0.09	-0.58	-0.80	-0.99	-1.17	-1.48	-1.95	-1.95
165°	-0.18	-0.15	0.10	0.01	0.02	-0.41	-0.58	-0.71	-0.86	-1.11	-1.58	-1.61
170°	-0.17	-0.15	0.13	0.07	0.11	-0.28	-0.38	-0.45	-0.56	-0.74	-1.13	-1.08
175°	-0.16	-0.13	0.15	0.12	0.17	-0.19	-0.25	-0.28	-0.36	-0.48	-0.81	-0.69
180°	-0.15	-0.14	0.15	0.12	0.18	-0.17	-0.22	-0.23	-0.28	-0.40	-0.70	-0.55
185°	-0.15	-0.13	0.15	0.11	0.16	-0.20	-0.26	-0.28	-0.35	-0.49	-0.81	-0.68
190°	-0.15	-0.14	0.14	0.09	0.11	-0.28	-0.39	-0.45	-0.56	-0.74	-1.13	-1.08
195°	-0.18	-0.17	0.11	0.03	0.02	-0.41	-0.58	-0.68	-0.85	-1.11	-1.59	-1.61
200°	-0.20	-0.19	0.07	-0.05	-0.07	-0.54	-0.77	-0.93	-1.14	-1.45	-1.96	-1.98
205°	-0.24	-0.22	0.02	-0.14	-0.20	-0.71	-0.98	-1.16	-1.37	-1.66	-2.05	-1.87
210°	-0.24	-0.24	-0.03	-0.24	-0.32	-0.85	-1.09	-1.22	-1.33	-1.47	-1.63	-1.24
215°	-0.29	-0.30	-0.09	-0.32	-0.39	-0.90	-0.97	-1.02	-0.98	-0.97	-1.04	-0.68
220°	-0.30	-0.32	-0.13	-0.40	-0.43	-0.86	-0.75	-0.69	-0.57	-0.53	-0.71	-0.58
225°	-0.32	-0.34	-0.16	-0.41	-0.31	-0.59	-0.31	-0.24	-0.16	-0.28	-0.73	-0.82
230°	-0.35	-0.35	-0.18	-0.39	-0.15	-0.35	-0.06	-0.07	-0.15	-0.46	-1.01	-0.91
235°	-0.35	-0.37	-0.17	-0.31	0.02	-0.17	-0.02	-0.18	-0.39	-0.73	-1.03	-0.57
240°	-0.35	-0.34	-0.15	-0.19	0.22	-0.05	-0.13	-0.39	-0.58	-0.71	-0.75	-0.40
245°	-0.36	-0.29	-0.11	-0.06	0.38	-0.05	-0.30	-0.53	-0.54	-0.47	-0.66	-0.79
250°	-0.34	-0.25	-0.05	0.09	0.50	-0.08	-0.35	-0.43	-0.28	-0.37	-1.00	-1.34
255°	-0.31	-0.22	0.04	0.21	0.54	-0.18	-0.27	-0.23	-0.18	-0.66	-1.46	-1.29
260°	-0.28	-0.17	0.11	0.28	0.46	-0.31	-0.20	-0.22	-0.45	-1.13	-1.47	-1.00
265°	-0.26	-0.11	0.19	0.31	0.35	-0.35	-0.16	-0.39	-0.85	-1.18	-1.15	-1.03
270°	-0.21	-0.06	0.25	0.30	0.25	-0.29	-0.23	-0.65	-0.98	-0.84	-1.03	-1.12
275°	-0.20	-0.01	0.30	0.26	0.15	-0.23	-0.46	-0.85	-0.76	-0.65	-1.17	-0.87
280°	-0.16	0.02	0.32	0.18	0.13	-0.15	-0.61	-0.73	-0.42	-0.68	-1.09	-0.55
285°	-0.13	0.05	0.32	0.10	0.12	-0.21	-0.68	-0.52	-0.36	-0.80	-0.82	-0.54
290°	-0.13	0.06	0.31	0.03	0.14	-0.32	-0.57	-0.33	-0.49	-0.67	-0.61	-0.58
295°	-0.08	0.10	0.27	-0.02	0.16	-0.45	-0.37	-0.28	-0.58	-0.42	-0.63	-0.44
300°	-0.06	0.10	0.23	-0.05	0.17	-0.57	-0.23	-0.39	-0.50	-0.29	-0.68	-0.28
305°	-0.04	0.10	0.18	-0.06	0.17	-0.59	-0.18	-0.47	-0.28	-0.31	-0.59	-0.29
310°	-0.05	0.10	0.14	-0.05	0.14	-0.54	-0.21	-0.45	-0.10	-0.36	-0.41	-0.34
315°	-0.01	0.09	0.09	-0.03	0.10	-0.43	-0.28	-0.33	-0.05	-0.33	-0.33	-0.27
320°	0.00	0.06	0.06	-0.03	0.07	-0.30	-0.32	-0.15	-0.08	-0.19	-0.34	-0.06
325°	-0.01	0.03	0.03	-0.01	0.04	-0.19	-0.33	-0.01	-0.15	-0.04	-0.40	0.10
330°	-0.01	0.03	0.01	-0.01	0.01	-0.10	-0.29	0.07	-0.19	0.07	-0.41	0.13
335°	0.01	0.00	0.01	-0.01	-0.01	-0.05	-0.23	0.10	-0.19	0.12	-0.36	0.08
340°	0.00	0.01	0.00	0.00	-0.01	-0.01	-0.16	0.09	-0.14	0.11	-0.26	0.02
345°	0.00	0.01	0.00	-0.01	-0.01	0.00	-0.09	0.06	-0.08	0.08	-0.15	-0.02
350°	-0.01	0.00	0.00	-0.01	-0.02	0.01	-0.04	0.03	-0.03	0.05	-0.08	-0.02
355°	0.01	0.00	0.01	0.00	0.00	0.00	-0.01	0.01	0.02	0.04	-0.02	-0.01

**Microphone Type 4966 for Hand-held Analyzer Types 2250, 2250-L and 2270 –  
Supplement to Instruction Manual BE 1712**

**Table A.22** Directional response for Microphone Type 4966, Microphone Preamplifier ZC-0032 and the analyzer with the microphone preamplifier mounted directly on the analyzer, measured in a plane parallel to the display and along the microphone's axis, 4000 Hz – 10600 Hz

Frequency												
Angle	4000 Hz	4500 Hz	5000 Hz	5600 Hz	6300 Hz	7100 Hz	8000 Hz	8500 Hz	9000 Hz	9500 Hz	10000 Hz	10600 Hz
0°	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.01	0.01	0.01	0.00	0.01
5°	0.01	0.01	0.01	-0.03	-0.05	-0.03	-0.04	-0.05	-0.05	-0.07	-0.05	-0.05
10°	0.03	0.03	0.02	-0.07	-0.16	-0.06	-0.13	-0.15	-0.14	-0.20	-0.17	-0.18
15°	0.10	0.08	0.04	-0.10	-0.30	-0.06	-0.23	-0.27	-0.24	-0.36	-0.31	-0.34
20°	0.19	0.11	0.04	-0.14	-0.48	-0.06	-0.30	-0.34	-0.28	-0.48	-0.42	-0.39
25°	0.20	0.01	-0.05	-0.20	-0.65	-0.20	-0.33	-0.43	-0.35	-0.67	-0.56	-0.41
30°	0.11	-0.18	-0.19	-0.28	-0.62	-0.36	-0.44	-0.60	-0.57	-0.98	-0.77	-0.54
35°	-0.07	-0.36	-0.27	-0.45	-0.60	-0.29	-0.76	-0.76	-0.83	-1.16	-1.14	-0.83
40°	-0.23	-0.42	-0.20	-0.71	-0.91	-0.38	-0.95	-0.85	-1.06	-1.29	-1.52	-1.06
45°	-0.29	-0.40	-0.11	-0.80	-1.23	-0.99	-1.16	-1.23	-1.24	-1.60	-1.85	-1.57
50°	-0.30	-0.49	-0.22	-0.85	-1.31	-1.07	-1.38	-1.43	-1.43	-1.96	-1.98	-2.01
55°	-0.43	-0.65	-0.39	-1.04	-1.63	-1.27	-1.31	-1.83	-1.67	-2.17	-2.43	-2.12
60°	-0.62	-0.75	-0.47	-1.02	-1.75	-1.76	-1.84	-1.83	-2.13	-2.33	-2.93	-2.42
65°	-0.66	-0.84	-0.61	-1.07	-1.84	-1.88	-2.06	-2.26	-2.30	-2.75	-3.08	-2.97
70°	-0.63	-0.95	-0.87	-1.28	-1.97	-2.30	-2.61	-2.65	-2.61	-3.03	-3.36	-3.23
75°	-0.77	-1.01	-1.00	-1.31	-1.88	-2.32	-2.70	-3.15	-3.12	-3.18	-3.83	-3.51
80°	-0.91	-1.10	-0.90	-1.72	-2.04	-2.34	-2.97	-3.30	-3.78	-3.76	-3.91	-4.22
85°	-0.92	-1.21	-0.94	-1.90	-2.24	-2.45	-3.14	-3.41	-3.88	-4.59	-4.46	-4.46
90°	-1.13	-1.37	-1.05	-1.76	-2.85	-2.48	-3.26	-3.44	-3.91	-4.59	-5.31	-4.89
95°	-1.49	-1.59	-1.13	-1.74	-2.49	-2.86	-3.44	-3.71	-3.89	-4.63	-5.27	-5.35
100°	-1.48	-1.89	-1.60	-1.74	-2.68	-2.90	-3.60	-4.00	-4.28	-4.70	-5.20	-5.39
105°	-1.36	-2.04	-1.91	-2.23	-2.43	-2.95	-3.65	-4.03	-4.62	-5.02	-5.39	-5.63
110°	-1.58	-1.87	-2.04	-2.80	-3.27	-2.80	-3.61	-3.66	-4.38	-5.02	-5.86	-5.77
115°	-1.54	-1.97	-1.94	-2.84	-3.62	-3.51	-3.71	-4.22	-4.28	-4.69	-5.43	-5.42
120°	-0.94	-1.81	-1.80	-2.67	-3.77	-4.02	-4.85	-4.54	-4.80	-5.29	-5.43	-5.30
125°	-0.56	-1.08	-1.42	-2.24	-3.39	-4.15	-4.89	-5.34	-6.06	-6.20	-6.42	-6.35
130°	-0.83	-0.89	-0.78	-1.86	-2.66	-3.31	-4.91	-5.37	-5.68	-6.33	-7.28	-7.37
135°	-1.19	-1.40	-0.77	-1.45	-2.35	-2.50	-3.48	-3.97	-5.03	-6.00	-6.73	-6.76
140°	-1.07	-1.64	-1.39	-1.66	-2.13	-2.25	-3.08	-3.37	-3.68	-4.19	-5.04	-5.41
145°	-0.86	-1.33	-1.45	-2.19	-2.84	-2.57	-3.12	-3.28	-3.81	-4.31	-4.89	-4.73
150°	-1.20	-1.41	-1.24	-2.08	-3.16	-3.30	-3.99	-4.09	-4.27	-4.47	-4.93	-4.96
155°	-1.87	-2.08	-1.66	-2.15	-2.96	-3.19	-4.09	-4.50	-5.17	-5.74	-6.20	-5.90
160°	-2.30	-2.72	-2.46	-2.95	-3.49	-3.52	-4.06	-4.17	-4.69	-5.29	-5.98	-6.25
165°	-2.07	-2.59	-2.57	-3.45	-4.11	-4.41	-5.14	-5.23	-5.48	-5.78	-6.19	-6.02
170°	-1.49	-1.93	-1.87	-2.86	-3.62	-4.06	-5.14	-5.54	-6.02	-6.60	-7.32	-7.30
175°	-1.01	-1.35	-1.16	-1.99	-2.70	-2.97	-3.85	-4.17	-4.64	-5.28	-6.04	-6.25
180°	-0.85	-1.15	-0.88	-1.61	-2.32	-2.51	-3.23	-3.47	-3.86	-4.41	-5.06	-5.19
185°	-1.01	-1.35	-1.12	-1.86	-2.77	-3.05	-3.86	-4.19	-4.66	-5.30	-6.09	-6.28
190°	-1.48	-1.93	-1.80	-2.67	-3.86	-4.22	-5.23	-5.70	-6.24	-6.88	-7.72	-7.71
195°	-2.06	-2.59	-2.51	-3.45	-4.56	-4.59	-5.37	-5.52	-5.90	-6.22	-6.58	-6.41
200°	-2.34	-2.77	-2.53	-3.27	-3.87	-3.68	-4.33	-4.41	-4.93	-5.43	-6.07	-6.45
205°	-2.00	-2.19	-1.80	-2.50	-3.11	-3.28	-4.27	-4.65	-5.29	-5.89	-6.40	-6.20
210°	-1.30	-1.47	-1.29	-2.30	-3.21	-3.47	-4.17	-4.33	-4.51	-4.73	-5.19	-5.34
215°	-0.94	-1.38	-1.48	-2.50	-2.93	-2.75	-3.28	-3.34	-4.01	-4.53	-5.02	-4.84
220°	-1.07	-1.67	-1.46	-1.93	-2.17	-2.40	-3.16	-3.53	-3.78	-4.23	-4.99	-5.41
225°	-1.22	-1.50	-0.96	-1.55	-2.44	-2.48	-3.46	-3.92	-5.07	-5.99	-6.87	-6.92
230°	-0.90	-0.98	-0.88	-1.77	-2.68	-3.29	-4.98	-5.55	-5.81	-6.44	-7.52	-7.76
235°	-0.61	-1.14	-1.41	-2.17	-3.47	-4.30	-4.95	-5.44	-6.28	-6.41	-6.72	-6.44
240°	-0.94	-1.80	-1.76	-2.66	-4.06	-4.11	-4.97	-4.82	-4.99	-5.41	-5.57	-5.52
245°	-1.53	-1.96	-1.93	-2.99	-3.67	-3.56	-3.72	-4.28	-4.37	-4.77	-5.73	-5.61
250°	-1.62	-1.93	-2.10	-2.99	-3.30	-2.90	-3.65	-3.81	-4.38	-5.11	-5.90	-5.70
255°	-1.43	-2.09	-2.00	-2.44	-2.45	-2.93	-3.72	-4.05	-4.67	-4.96	-5.35	-5.69
260°	-1.52	-1.95	-1.64	-1.74	-2.86	-2.89	-3.56	-4.00	-4.28	-4.72	-5.30	-5.49
265°	-1.49	-1.62	-1.16	-1.71	-2.58	-2.84	-3.40	-3.77	-3.99	-4.61	-5.39	-5.28
270°	-1.13	-1.36	-1.04	-1.86	-2.77	-2.37	-3.22	-3.52	-3.97	-4.57	-5.35	-4.87
275°	-0.91	-1.19	-0.98	-1.97	-2.09	-2.40	-3.15	-3.43	-3.81	-4.60	-4.59	-4.47
280°	-0.89	-1.11	-1.03	-1.80	-2.12	-2.30	-3.00	-3.30	-3.87	-3.85	-3.92	-4.17
285°	-0.77	-1.03	-1.03	-1.25	-1.99	-2.35	-2.61	-3.25	-3.25	-3.11	-3.82	-3.51
290°	-0.64	-0.99	-0.84	-1.26	-1.93	-2.19	-2.61	-2.78	-2.56	-2.92	-3.45	-3.17
295°	-0.67	-0.85	-0.58	-1.18	-1.87	-1.78	-2.19	-2.27	-2.25	-2.81	-3.08	-2.90
300°	-0.65	-0.72	-0.44	-1.08	-1.69	-1.72	-1.82	-1.78	-2.18	-2.33	-2.91	-2.48
305°	-0.45	-0.60	-0.43	-1.05	-1.62	-1.30	-1.28	-1.84	-1.79	-2.09	-2.55	-2.15
310°	-0.28	-0.42	-0.28	-0.84	-1.18	-1.10	-1.28	-1.56	-1.40	-1.91	-2.06	-1.83
315°	-0.26	-0.35	-0.18	-0.85	-1.21	-0.95	-1.21	-1.29	-1.15	-1.68	-1.86	-1.53
320°	-0.19	-0.40	-0.23	-0.82	-1.05	-0.28	-1.00	-0.83	-1.01	-1.36	-1.39	-1.01
325°	-0.03	-0.38	-0.25	-0.54	-0.72	-0.19	-0.81	-0.70	-0.89	-1.16	-1.15	-0.90
330°	0.14	-0.23	-0.17	-0.26	-0.65	-0.25	-0.45	-0.52	-0.66	-0.91	-0.81	-0.53
335°	0.23	-0.05	-0.04	-0.09	-0.60	-0.12	-0.29	-0.40	-0.42	-0.61	-0.61	-0.38
340°	0.22	0.06	0.03	-0.02	-0.38	-0.03	-0.23	-0.38	-0.31	-0.45	-0.51	-0.35
345°	0.17	0.06	0.05	0.01	-0.17	-0.04	-0.13	-0.29	-0.23	-0.31	-0.35	-0.27
350°	0.10	0.03	0.03	0.00	-0.04	-0.06	-0.03	-0.18	-0.12	-0.15	-0.20	-0.13
355°	0.06	-0.01	0.03	0.00	0.02	-0.03	0.04	-0.07	-0.02	-0.01	-0.08	0.00

**Table A.23** Directional response for Microphone Type 4966, Microphone Preamplifier ZC-0032 and the analyzer with the microphone preamplifier mounted directly on the analyzer, measured in a plane parallel to the display and along the microphone's axis, 11200 Hz – 20000 Hz

Frequency											
Angle	11200 Hz	11800 Hz	12500 Hz	13200 Hz	14000 Hz	15000 Hz	16000 Hz	17000 Hz	18000 Hz	19000 Hz	20000 Hz
0°	0.01	0.00	0.01	0.01	0.00	-0.01	-0.01	-0.02	-0.01	0.01	0.01
5°	-0.05	-0.07	-0.07	-0.05	-0.07	-0.06	-0.08	-0.11	-0.08	-0.09	-0.09
10°	-0.12	-0.17	-0.19	-0.14	-0.14	-0.18	-0.21	-0.23	-0.19	-0.30	-0.28
15°	-0.25	-0.32	-0.26	-0.33	-0.13	-0.45	-0.42	-0.32	-0.31	-0.44	-0.45
20°	-0.42	-0.59	-0.28	-0.52	-0.22	-0.93	-0.63	-0.49	-0.49	-0.79	-0.66
25°	-0.59	-0.98	-0.55	-0.77	-0.58	-1.16	-1.02	-0.95	-0.88	-1.37	-1.24
30°	-0.79	-1.19	-0.79	-1.24	-0.78	-1.33	-1.58	-1.36	-1.28	-1.89	-1.86
35°	-1.19	-1.55	-1.25	-1.50	-1.22	-1.45	-2.27	-1.95	-1.66	-2.27	-2.41
40°	-1.34	-1.68	-1.83	-1.87	-1.72	-2.00	-2.55	-2.63	-2.28	-2.87	-3.16
45°	-1.70	-2.16	-2.32	-2.26	-2.31	-2.55	-2.85	-3.30	-3.16	-3.68	-3.88
50°	-2.05	-2.44	-2.40	-2.98	-2.84	-2.97	-3.56	-3.66	-3.89	-4.34	-4.45
55°	-2.64	-2.77	-2.89	-3.43	-3.34	-3.71	-4.25	-4.07	-4.58	-5.47	-5.41
60°	-3.11	-3.39	-3.46	-3.76	-4.00	-4.40	-4.95	-5.22	-5.10	-5.93	-6.41
65°	-3.19	-4.08	-3.79	-4.53	-4.10	-5.21	-5.78	-5.70	-6.22	-6.64	-7.31
70°	-3.71	-4.22	-4.24	-5.05	-4.76	-5.57	-6.32	-6.91	-6.77	-7.56	-8.23
75°	-4.00	-4.74	-4.52	-5.39	-5.55	-6.09	-6.70	-7.51	-7.66	-8.64	-9.21
80°	-4.09	-5.19	-5.18	-5.76	-5.93	-6.92	-7.51	-7.85	-8.31	-9.59	-10.10
85°	-4.97	-5.16	-5.88	-6.23	-6.57	-7.10	-8.53	-8.51	-9.10	-10.02	-11.07
90°	-5.46	-5.88	-5.98	-6.89	-6.89	-8.00	-8.36	-9.54	-9.58	-10.86	-11.84
95°	-6.02	-6.60	-6.48	-7.19	-7.54	-8.29	-9.29	-9.52	-10.43	-11.36	-12.46
100°	-5.99	-7.09	-7.38	-7.75	-7.81	-9.00	-9.67	-10.54	-10.84	-11.92	-13.25
105°	-6.04	-6.96	-7.39	-8.64	-8.67	-9.23	-10.25	-11.12	-11.44	-12.69	-13.67
110°	-6.55	-7.46	-7.34	-8.27	-9.10	-9.96	-10.90	-11.31	-12.00	-13.09	-14.59
115°	-6.64	-7.55	-8.00	-8.82	-8.79	-9.83	-11.49	-11.96	-12.37	-13.63	-15.05
120°	-6.15	-6.62	-7.53	-8.85	-9.07	-10.33	-11.63	-12.05	-12.95	-13.87	-15.07
125°	-6.39	-6.89	-7.48	-7.87	-7.96	-9.71	-11.12	-12.27	-12.90	-14.88	-16.19
130°	-7.82	-8.61	-8.88	-8.73	-8.89	-9.84	-10.14	-10.98	-11.59	-13.39	-14.83
135°	-7.81	-8.94	-9.35	-10.23	-11.19	-12.33	-12.19	-12.37	-12.42	-12.92	-14.22
140°	-6.63	-7.81	-8.26	-9.42	-10.02	-11.26	-12.58	-14.30	-15.79	-16.38	-17.47
145°	-5.15	-5.98	-6.67	-7.84	-8.18	-9.20	-10.70	-11.77	-12.81	-14.08	-16.04
150°	-5.86	-6.63	-6.93	-7.41	-7.53	-8.54	-9.51	-10.34	-11.03	-12.23	-13.66
155°	-6.31	-6.88	-7.23	-8.21	-8.45	-9.82	-10.69	-10.96	-11.31	-12.41	-13.86
160°	-7.17	-8.04	-8.60	-9.28	-9.48	-10.22	-11.06	-11.48	-12.30	-13.80	-15.23
165°	-6.72	-7.27	-7.76	-8.66	-9.02	-10.38	-11.65	-12.52	-13.47	-14.73	-15.63
170°	-7.97	-8.56	-8.69	-9.44	-9.42	-10.26	-10.95	-11.26	-11.93	-13.22	-13.78
175°	-7.15	-8.15	-8.58	-9.51	-10.01	-11.21	-12.47	-13.15	-14.00	-15.61	-16.07
180°	-6.01	-6.90	-7.33	-8.11	-8.58	-9.73	-10.95	-11.73	-12.77	-14.43	-15.70
185°	-7.14	-8.22	-8.72	-9.72	-10.38	-11.59	-12.76	-13.17	-14.37	-16.21	-17.16
190°	-8.39	-9.23	-9.47	-10.29	-10.24	-11.04	-11.57	-11.84	-12.48	-14.30	-15.01
195°	-7.20	-7.80	-8.32	-9.17	-9.53	-10.76	-11.86	-12.70	-14.01	-16.02	-16.59
200°	-7.45	-8.42	-9.15	-9.78	-9.94	-10.58	-11.47	-12.02	-12.94	-14.94	-16.02
205°	-6.83	-7.38	-7.66	-8.58	-8.79	-10.20	-11.08	-11.08	-11.57	-13.21	-13.49
210°	-6.26	-7.03	-7.24	-7.57	-7.54	-8.40	-9.36	-10.25	-10.89	-12.58	-13.45
215°	-5.26	-5.93	-6.66	-7.83	-8.19	-9.36	-10.74	-11.90	-13.05	-14.84	-15.79
220°	-6.77	-7.85	-8.42	-9.60	-10.42	-11.54	-12.27	-14.04	-15.70	-16.92	-17.67
225°	-8.05	-9.25	-9.84	-10.33	-11.18	-12.51	-12.23	-12.55	-12.65	-13.78	-14.47
230°	-8.13	-8.86	-9.22	-8.77	-8.76	-10.16	-10.28	-10.92	-11.59	-13.69	-14.49
235°	-6.66	-6.96	-7.79	-8.16	-8.05	-9.63	-10.71	-11.78	-12.63	-15.19	-16.14
240°	-6.45	-6.84	-7.77	-8.88	-8.75	-10.16	-11.52	-11.79	-13.10	-14.77	-15.19
245°	-6.68	-7.61	-8.04	-8.76	-8.86	-9.94	-11.41	-11.61	-12.10	-14.17	-14.95
250°	-6.55	-7.54	-7.50	-8.35	-9.06	-9.83	-10.73	-10.94	-11.98	-13.81	-14.27
255°	-6.21	-6.92	-7.51	-8.61	-8.59	-9.24	-10.06	-10.58	-11.23	-13.11	-13.36
260°	-6.08	-7.11	-7.46	-7.85	-7.86	-8.86	-9.39	-10.10	-10.73	-12.52	-12.96
265°	-6.10	-6.69	-6.66	-7.21	-7.37	-8.22	-9.04	-9.07	-10.31	-11.84	-12.09
270°	-5.66	-5.85	-5.96	-6.86	-6.83	-7.87	-8.10	-9.10	-9.54	-11.37	-11.40
275°	-4.99	-5.10	-5.84	-6.37	-6.51	-7.05	-8.13	-8.12	-8.99	-10.34	-10.90
280°	-4.14	-5.08	-5.27	-5.87	-5.89	-6.70	-7.35	-7.45	-8.35	-10.07	-9.89
285°	-3.99	-4.74	-4.66	-5.43	-5.44	-6.00	-6.38	-7.32	-7.66	-8.90	-9.11
290°	-3.68	-4.34	-4.29	-5.07	-4.73	-5.28	-6.16	-6.70	-6.74	-7.96	-8.18
295°	-3.34	-4.07	-3.80	-4.66	-3.86	-5.17	-5.40	-5.60	-6.23	-6.87	-7.17
300°	-3.10	-3.38	-3.56	-3.72	-3.93	-4.18	-4.73	-4.88	-5.04	-6.14	-6.38
305°	-2.59	-2.81	-2.93	-3.39	-3.39	-3.52	-4.08	-4.00	-4.61	-5.66	-5.37
310°	-2.05	-2.44	-2.34	-3.06	-2.60	-2.87	-3.41	-3.43	-3.87	-4.52	-4.48
315°	-1.83	-2.13	-2.31	-2.28	-2.19	-2.32	-2.74	-3.17	-3.08	-3.76	-3.82
320°	-1.26	-1.61	-1.86	-1.79	-1.72	-1.85	-2.36	-2.58	-2.23	-3.03	-3.21
325°	-1.16	-1.57	-1.23	-1.50	-1.18	-1.41	-2.13	-1.95	-1.66	-2.34	-2.41
330°	-0.76	-1.22	-0.76	-1.34	-0.70	-1.23	-1.55	-1.32	-1.22	-1.95	-1.86
335°	-0.58	-0.99	-0.48	-0.79	-0.55	-1.05	-0.99	-0.90	-0.77	-1.41	-1.30
340°	-0.44	-0.62	-0.29	-0.52	-0.22	-0.87	-0.61	-0.54	-0.46	-0.83	-0.69
345°	-0.28	-0.28	-0.27	-0.30	-0.14	-0.41	-0.36	-0.37	-0.27	-0.44	-0.46
350°	-0.17	-0.08	-0.20	-0.12	-0.14	-0.14	-0.14	-0.19	-0.20	-0.29	-0.25
355°	-0.07	0.02	-0.07	-0.02	-0.04	-0.02	0.01	-0.08	-0.08	-0.08	-0.08

**Microphone Type 4966 for Hand-held Analyzer Types 2250, 2250-L and 2270 –  
Supplement to Instruction Manual BE 1712**

**Table A.24** Directional response for Microphone Type 4966, Microphone Preamplifier ZC-0032 and the analyzer with the microphone preamplifier mounted directly on the analyzer, measured in a plane perpendicular to the display and along the microphone's axis, 500 Hz – 3550 Hz

Frequency												
Angle	500 Hz	630 Hz	800 Hz	1000 Hz	1250 Hz	1600 Hz	2000 Hz	2240 Hz	2500 Hz	2800 Hz	3150 Hz	3550 Hz
0°	0.02	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	0.00
5°	0.00	-0.01	0.00	0.01	-0.01	0.00	-0.01	-0.01	-0.02	0.00	-0.02	-0.01
10°	-0.01	0.01	-0.01	0.02	-0.01	0.00	-0.03	0.01	-0.05	0.01	-0.06	-0.03
15°	-0.01	0.02	-0.01	0.02	-0.02	-0.01	-0.06	0.03	-0.10	0.05	-0.11	-0.04
20°	-0.02	0.02	-0.02	0.02	-0.03	-0.02	-0.11	0.06	-0.17	0.08	-0.19	-0.03
25°	-0.04	0.01	-0.03	0.02	-0.05	-0.05	-0.18	0.07	-0.26	0.09	-0.31	-0.02
30°	-0.02	0.05	-0.03	0.02	-0.04	-0.08	-0.24	0.08	-0.29	0.07	-0.37	0.03
35°	-0.03	0.04	-0.03	0.02	-0.03	-0.16	-0.31	0.03	-0.27	-0.04	-0.39	0.00
40°	-0.06	0.09	-0.01	0.02	0.00	-0.26	-0.33	-0.08	-0.21	-0.22	-0.33	-0.15
45°	-0.05	0.11	0.01	-0.01	0.04	-0.39	-0.31	-0.23	-0.13	-0.43	-0.27	-0.40
50°	-0.08	0.13	0.05	-0.04	0.09	-0.51	-0.25	-0.38	-0.15	-0.50	-0.35	-0.56
55°	-0.10	0.14	0.10	-0.06	0.12	-0.59	-0.21	-0.41	-0.30	-0.36	-0.62	-0.47
60°	-0.16	0.15	0.16	-0.07	0.13	-0.59	-0.24	-0.33	-0.51	-0.20	-0.90	-0.36
65°	-0.14	0.14	0.21	-0.05	0.11	-0.51	-0.37	-0.22	-0.62	-0.24	-0.84	-0.56
70°	-0.17	0.12	0.26	0.00	0.07	-0.39	-0.57	-0.23	-0.51	-0.52	-0.58	-0.94
75°	-0.20	0.09	0.29	0.09	0.04	-0.27	-0.72	-0.40	-0.36	-0.70	-0.58	-0.89
80°	-0.23	0.07	0.31	0.19	0.04	-0.23	-0.71	-0.67	-0.44	-0.55	-0.91	-0.58
85°	-0.26	0.02	0.29	0.29	0.09	-0.26	-0.57	-0.81	-0.78	-0.43	-1.02	-0.76
90°	-0.29	-0.04	0.26	0.36	0.19	-0.34	-0.43	-0.70	-1.07	-0.73	-0.80	-1.13
95°	-0.37	-0.08	0.20	0.39	0.33	-0.37	-0.39	-0.48	-1.00	-1.22	-0.93	-0.89
100°	-0.38	-0.16	0.12	0.37	0.49	-0.28	-0.42	-0.35	-0.67	-1.21	-1.51	-0.84
105°	-0.39	-0.22	0.05	0.30	0.58	-0.12	-0.46	-0.44	-0.51	-0.76	-1.68	-1.53
110°	-0.42	-0.28	-0.04	0.18	0.57	0.03	-0.39	-0.56	-0.67	-0.58	-1.15	-1.80
115°	-0.47	-0.30	-0.12	0.03	0.48	0.13	-0.16	-0.43	-0.78	-0.80	-0.86	-1.12
120°	-0.45	-0.34	-0.18	-0.13	0.31	0.12	0.07	-0.10	-0.56	-0.92	-1.11	-0.84
125°	-0.43	-0.37	-0.21	-0.27	0.09	-0.01	0.17	0.20	-0.11	-0.52	-1.20	-1.18
130°	-0.45	-0.37	-0.23	-0.37	-0.12	-0.24	0.06	0.26	0.20	0.07	-0.62	-1.03
135°	-0.44	-0.35	-0.21	-0.41	-0.31	-0.56	-0.32	-0.06	0.07	0.22	-0.05	-0.24
140°	-0.37	-0.35	-0.18	-0.40	-0.42	-0.83	-0.79	-0.60	-0.46	-0.19	-0.11	0.15
145°	-0.37	-0.31	-0.14	-0.34	-0.42	-0.94	-1.10	-1.06	-1.08	-0.92	-0.79	-0.31
150°	-0.32	-0.29	-0.08	-0.26	-0.32	-0.88	-1.17	-1.27	-1.50	-1.58	-1.74	-1.38
155°	-0.29	-0.25	-0.02	-0.16	-0.21	-0.75	-1.04	-1.20	-1.54	-1.79	-2.29	-2.30
160°	-0.26	-0.21	0.04	-0.07	-0.09	-0.59	-0.83	-0.96	-1.28	-1.55	-2.14	-2.38
165°	-0.24	-0.18	0.08	0.01	0.02	-0.43	-0.59	-0.66	-0.91	-1.10	-1.59	-1.79
170°	-0.23	-0.16	0.12	0.07	0.11	-0.29	-0.38	-0.40	-0.58	-0.68	-1.05	-1.13
175°	-0.20	-0.15	0.14	0.12	0.16	-0.21	-0.26	-0.23	-0.37	-0.41	-0.71	-0.70
180°	-0.19	-0.14	0.15	0.12	0.18	-0.18	-0.22	-0.18	-0.31	-0.33	-0.60	-0.57
185°	-0.21	-0.14	0.14	0.11	0.17	-0.20	-0.26	-0.24	-0.38	-0.42	-0.71	-0.71
190°	-0.22	-0.16	0.12	0.08	0.12	-0.30	-0.39	-0.41	-0.59	-0.69	-1.06	-1.15
195°	-0.26	-0.17	0.10	0.02	0.04	-0.42	-0.59	-0.66	-0.91	-1.11	-1.59	-1.80
200°	-0.26	-0.21	0.05	-0.05	-0.05	-0.56	-0.80	-0.92	-1.26	-1.55	-2.13	-2.40
205°	-0.30	-0.24	0.00	-0.15	-0.18	-0.75	-1.06	-1.22	-1.57	-1.86	-2.35	-2.37
210°	-0.33	-0.26	-0.07	-0.25	-0.31	-0.92	-1.21	-1.31	-1.56	-1.66	-1.81	-1.43
215°	-0.35	-0.30	-0.12	-0.34	-0.38	-0.96	-1.11	-1.08	-1.12	-0.95	-0.85	-0.35
220°	-0.40	-0.33	-0.17	-0.40	-0.42	-0.91	-0.85	-0.65	-0.52	-0.21	-0.13	0.13
225°	-0.44	-0.34	-0.22	-0.41	-0.29	-0.59	-0.32	-0.04	0.10	0.29	0.02	-0.20
230°	-0.44	-0.35	-0.23	-0.37	-0.13	-0.29	0.05	0.27	0.23	0.12	-0.56	-0.99
235°	-0.47	-0.35	-0.22	-0.27	0.07	-0.05	0.17	0.22	-0.07	-0.47	-1.18	-1.17
240°	-0.48	-0.33	-0.19	-0.13	0.28	0.11	0.10	-0.07	-0.52	-0.90	-1.15	-0.88
245°	-0.48	-0.31	-0.13	0.03	0.46	0.14	-0.14	-0.42	-0.77	-0.81	-0.90	-1.15
250°	-0.46	-0.27	-0.05	0.20	0.58	0.09	-0.33	-0.51	-0.63	-0.58	-1.14	-1.80
255°	-0.45	-0.26	0.03	0.32	0.60	-0.05	-0.41	-0.38	-0.48	-0.75	-1.66	-1.56
260°	-0.41	-0.16	0.13	0.39	0.51	-0.24	-0.40	-0.32	-0.67	-1.22	-1.55	-0.89
265°	-0.39	-0.09	0.21	0.41	0.37	-0.33	-0.44	-1.01	-1.23	-0.94	-0.91	-0.91
270°	-0.35	-0.03	0.28	0.39	0.23	-0.30	-0.37	-0.67	-1.07	-0.74	-0.78	-1.13
275°	-0.31	0.00	0.32	0.31	0.12	-0.25	-0.54	-0.85	-0.79	-0.46	-1.05	-0.77
280°	-0.28	0.07	0.34	0.21	0.09	-0.18	-0.65	-0.67	-0.40	-0.53	-0.93	-0.53
285°	-0.24	0.09	0.33	0.12	0.08	-0.24	-0.70	-0.41	-0.35	-0.72	-0.57	-0.79
290°	-0.23	0.14	0.29	0.03	0.11	-0.34	-0.58	-0.20	-0.51	-0.55	-0.51	-0.83
295°	-0.16	0.13	0.25	-0.02	0.14	-0.46	-0.37	-0.17	-0.62	-0.23	-0.73	-0.52
300°	-0.17	0.16	0.20	-0.06	0.16	-0.54	-0.23	-0.29	-0.52	-0.15	-0.78	-0.38
305°	-0.10	0.16	0.15	-0.06	0.16	-0.55	-0.18	-0.40	-0.29	-0.28	-0.57	-0.50
310°	-0.12	0.16	0.10	-0.03	0.12	-0.47	-0.22	-0.37	-0.11	-0.39	-0.35	-0.55
315°	-0.08	0.13	0.05	0.00	0.07	-0.35	-0.28	-0.25	-0.08	-0.33	-0.30	-0.39
320°	-0.09	0.13	0.03	0.01	0.03	-0.22	-0.31	-0.08	-0.14	-0.16	-0.34	-0.13
325°	-0.08	0.10	0.01	0.03	0.00	-0.12	-0.30	0.03	-0.20	0.00	-0.39	0.01
330°	-0.04	0.06	0.00	0.03	-0.02	-0.05	-0.24	0.09	-0.21	0.08	-0.36	0.05
335°	-0.05	0.05	0.01	0.02	-0.02	-0.02	-0.18	0.09	-0.19	0.10	-0.28	0.02
340°	-0.04	0.05	0.01	0.01	-0.02	0.01	-0.12	0.08	-0.13	0.08	-0.18	-0.01
345°	-0.03	0.02	0.00	0.00	-0.01	0.01	-0.07	0.06	-0.06	0.06	-0.10	-0.02
350°	-0.02	0.04	0.01	0.00	-0.01	0.02	-0.03	0.03	-0.02	0.03	-0.05	-0.02
355°	-0.04	0.01	0.00	0.00	0.00	0.01	-0.01	0.02	0.02	0.02	-0.01	0.00

**Table A.25** Directional response for Microphone Type 4966, Microphone Preamplifier ZC-0032 and the analyzer with the microphone preamplifier mounted directly on the analyzer, measured in a plane perpendicular to the display and along the microphone's axis, 4000 Hz – 10600 Hz

Frequency												
Angle	4000 Hz	4500 Hz	5000 Hz	5600 Hz	6300 Hz	7100 Hz	8000 Hz	8500 Hz	9000 Hz	9500 Hz	10000 Hz	10600 Hz
0°	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
5°	0.01	0.01	0.02	-0.03	-0.04	-0.02	-0.05	-0.06	-0.02	-0.08	-0.06	-0.06
10°	0.04	0.05	0.02	0.00	-0.13	-0.01	-0.11	-0.14	-0.04	-0.18	-0.18	-0.16
15°	0.10	0.09	0.04	0.08	-0.27	0.04	-0.20	-0.22	-0.06	-0.33	-0.33	-0.29
20°	0.15	0.08	0.03	0.17	-0.44	0.05	-0.28	-0.31	-0.06	-0.49	-0.38	-0.35
25°	0.13	-0.05	-0.09	0.16	-0.59	-0.13	-0.34	-0.51	-0.25	-0.74	-0.44	-0.49
30°	0.02	-0.30	-0.26	-0.07	-0.60	-0.39	-0.40	-0.72	-0.56	-0.93	-0.72	-0.77
35°	-0.20	-0.47	-0.30	-0.45	-0.76	-0.38	-0.80	-0.75	-0.78	-0.95	-1.19	-0.87
40°	-0.37	-0.38	-0.09	-0.59	-1.19	-0.49	-1.12	-0.78	-1.12	-1.25	-1.65	-1.05
45°	-0.34	-0.22	-0.04	-0.57	-1.19	-1.06	-1.02	-1.27	-1.03	-1.71	-1.70	-1.56
50°	-0.22	-0.37	-0.42	-0.90	-1.24	-1.01	-1.55	-1.46	-1.19	-2.16	-2.02	-2.01
55°	-0.34	-0.77	-0.52	-0.94	-1.78	-1.27	-1.36	-1.73	-1.75	-1.97	-2.64	-2.13
60°	-0.70	-0.80	-0.31	-0.83	-1.73	-1.62	-2.11	-1.96	-1.77	-2.62	-2.61	-2.54
65°	-0.78	-0.64	-0.65	-1.21	-1.97	-1.90	-1.95	-2.50	-2.35	-2.43	-3.27	-2.83
70°	-0.62	-1.01	-0.93	-0.93	-1.96	-2.22	-2.74	-2.46	-2.69	-3.11	-3.24	-3.39
75°	-0.87	-1.20	-0.71	-1.19	-2.22	-2.28	-2.71	-3.37	-2.76	-3.53	-3.82	-3.50
80°	-1.29	-0.99	-1.03	-1.60	-1.92	-2.40	-2.89	-3.35	-3.75	-3.51	-4.26	-4.23
85°	-1.05	-1.50	-1.02	-1.61	-2.34	-2.47	-3.31	-3.25	-3.92	-4.31	-4.45	-4.70
90°	-0.87	-1.70	-1.07	-1.86	-2.51	-2.34	-3.42	-3.72	-3.52	-4.91	-4.82	-5.29
95°	-1.33	-1.19	-1.74	-1.56	-2.89	-2.73	-3.23	-3.84	-3.94	-4.64	-5.29	-5.37
100°	-1.26	-1.66	-1.28	-2.07	-2.77	-2.87	-3.63	-3.81	-4.12	-4.64	-5.35	-5.33
105°	-1.04	-1.71	-1.45	-2.01	-3.12	-3.17	-3.68	-3.96	-4.28	-4.71	-5.40	-5.23
110°	-1.82	-1.46	-1.71	-2.10	-2.77	-3.40	-4.06	-4.37	-4.28	-5.12	-5.49	-5.55
115°	-2.08	-2.36	-1.34	-2.39	-3.12	-2.94	-4.26	-4.39	-4.90	-5.39	-5.61	-5.94
120°	-1.21	-2.34	-2.45	-1.93	-3.28	-3.39	-3.77	-4.51	-4.82	-5.27	-6.40	-6.30
125°	-1.05	-1.38	-2.04	-3.17	-3.37	-3.32	-4.45	-4.23	-4.35	-5.40	-5.83	-6.00
130°	-1.50	-1.55	-1.05	-2.17	-4.04	-4.25	-4.39	-4.84	-5.26	-5.50	-5.62	-5.66
135°	-0.99	-1.76	-1.59	-1.69	-2.49	-3.39	-5.36	-5.38	-5.35	-5.91	-6.80	-6.72
140°	-0.10	-0.81	-1.28	-2.28	-2.98	-2.42	-3.40	-4.22	-5.05	-6.11	-6.81	-7.01
145°	-0.08	-0.24	-0.07	-1.01	-2.78	-3.32	-3.82	-3.72	-3.77	-4.24	-4.84	-5.24
150°	-1.07	-0.91	-0.17	-0.31	-1.29	-1.81	-3.41	-4.04	-4.61	-5.29	-5.57	-5.15
155°	-2.38	-2.39	-1.69	-1.49	-1.72	-1.41	-2.04	-2.36	-2.78	-3.67	-4.60	-4.93
160°	-2.88	-3.42	-3.37	-3.76	-3.94	-3.41	-3.48	-3.31	-3.26	-3.54	-3.88	-3.77
165°	-2.32	-3.00	-3.27	-4.51	-5.56	-5.68	-6.61	-6.65	-6.72	-7.01	-7.18	-6.79
170°	-1.49	-2.02	-2.06	-3.14	-4.39	-4.71	-6.14	-6.78	-7.38	-8.38	-9.35	-9.74
175°	-0.92	-1.33	-1.15	-1.91	-2.96	-3.10	-4.06	-4.46	-4.81	-5.54	-6.31	-6.58
180°	-0.75	-1.11	-0.85	-1.44	-2.41	-2.53	-3.34	-3.62	-3.88	-4.49	-5.10	-5.25
185°	-0.94	-1.34	-1.14	-1.74	-2.81	-3.11	-4.11	-4.46	-4.82	-5.53	-6.23	-6.50
190°	-1.51	-2.04	-1.99	-2.79	-4.14	-4.88	-6.24	-6.84	-7.40	-8.28	-9.40	-9.76
195°	-2.35	-2.99	-3.12	-4.15	-5.59	-6.34	-6.95	-7.03	-7.12	-7.53	-7.75	-7.41
200°	-2.96	-3.46	-3.32	-3.96	-4.64	-4.01	-3.84	-3.56	-3.56	-3.83	-4.21	-4.05
205°	-2.52	-2.52	-1.79	-1.99	-2.37	-1.59	-2.18	-2.28	-2.71	-3.67	-4.63	-4.98
210°	-1.16	-0.98	-0.28	-0.78	-1.61	-1.66	-3.34	-3.95	-4.73	-5.62	-5.93	-5.50
215°	-0.12	-0.27	-0.17	-1.39	-2.77	-3.23	-3.91	-3.86	-4.05	-4.44	-4.97	-5.50
220°	-0.06	-0.78	-1.26	-2.38	-2.97	-2.61	-3.63	-4.32	-5.18	-6.26	-6.98	-7.47
225°	-0.93	-1.77	-1.67	-1.77	-2.59	-3.55	-5.30	-5.38	-5.53	-6.16	-7.46	-7.34
230°	-1.49	-1.61	-1.23	-2.05	-4.01	-4.25	-4.71	-5.23	-5.79	-5.89	-5.74	-5.69
235°	-1.09	-1.45	-2.08	-3.08	-3.66	-3.60	-4.63	-4.12	-4.22	-5.29	-5.94	-5.82
240°	-1.22	-2.39	-2.43	-2.16	-3.55	-3.50	-3.66	-4.46	-4.78	-5.01	-6.37	-6.71
245°	-2.09	-2.41	-1.36	-2.68	-3.35	-2.63	-4.22	-4.13	-4.84	-5.92	-6.00	-6.05
250°	-1.84	-1.51	-1.86	-2.31	-2.53	-3.40	-4.02	-4.67	-4.45	-5.15	-5.51	-5.36
255°	-1.08	-1.81	-1.60	-1.84	-3.02	-3.17	-3.93	-3.82	-4.11	-4.56	-5.61	-5.12
260°	-1.29	-1.76	-1.24	-1.89	-2.89	-3.13	-3.40	-3.62	-4.09	-4.67	-5.29	-5.36
265°	-1.36	-1.17	-1.58	-1.66	-3.15	-2.47	-3.24	-3.71	-3.83	-4.54	-5.31	-5.37
270°	-0.86	-1.53	-1.02	-2.14	-2.50	-2.27	-3.29	-3.58	-3.33	-4.81	-4.92	-5.31
275°	-0.98	-1.39	-1.15	-1.65	-2.13	-2.49	-3.22	-2.97	-3.87	-4.32	-4.63	-4.82
280°	-1.19	-1.03	-1.16	-1.39	-1.97	-2.27	-2.76	-3.26	-3.75	-3.56	-4.40	-3.80
285°	-0.84	-1.27	-0.77	-1.07	-2.34	-2.25	-2.70	-3.28	-2.73	-3.52	-3.51	-3.33
290°	-0.65	-1.06	-0.78	-1.12	-1.84	-2.06	-2.67	-2.39	-2.61	-2.81	-3.24	-3.52
295°	-0.80	-0.64	-0.50	-1.39	-1.82	-1.94	-1.99	-2.34	-1.99	-2.36	-3.49	-2.85
300°	-0.68	-0.70	-0.30	-0.82	-1.68	-1.50	-1.97	-1.61	-1.62	-2.80	-2.59	-2.36
305°	-0.32	-0.65	-0.58	-0.71	-1.88	-1.36	-1.09	-1.51	-1.94	-1.82	-2.72	-1.99
310°	-0.16	-0.27	-0.46	-0.70	-1.25	-1.14	-1.30	-1.51	-1.13	-2.08	-1.94	-1.93
315°	-0.26	-0.18	-0.06	-0.66	-1.14	-0.88	-0.94	-1.39	-0.82	-1.67	-1.56	-1.58
320°	-0.27	-0.38	-0.04	-0.78	-1.03	-0.12	-1.26	-0.51	-0.93	-1.23	-1.75	-1.02
325°	-0.11	-0.49	-0.17	-0.56	-0.71	-0.15	-0.97	-0.57	-0.64	-0.84	-1.28	-0.84
330°	0.08	-0.31	-0.16	-0.07	-0.75	-0.26	-0.23	-0.59	-0.52	-1.01	-0.70	-0.72
335°	0.18	-0.06	-0.03	0.23	-0.84	-0.06	-0.12	-0.31	-0.13	-0.91	-0.45	-0.38
340°	0.18	0.08	0.04	0.25	-0.61	0.08	-0.23	-0.21	0.06	-0.52	-0.41	-0.19
345°	0.14	0.09	0.06	0.16	-0.29	0.03	-0.20	-0.22	-0.01	-0.24	-0.38	-0.11
350°	0.08	0.05	0.04	0.07	-0.09	-0.04	-0.08	-0.16	-0.06	-0.08	-0.25	-0.04
355°	0.06	0.01	0.04	0.03	0.02	-0.03	0.04	-0.06	-0.01	0.03	-0.08	0.05

**Microphone Type 4966 for Hand-held Analyzer Types 2250, 2250-L and 2270 –  
Supplement to Instruction Manual BE 1712**

**Table A.26** Directional response for Microphone Type 4966, Microphone Preamplifier ZC-0032 and the analyzer with the microphone preamplifier mounted directly on the analyzer, measured in a plane perpendicular to the display and along the microphone's axis, 11200 Hz – 20000 Hz

Frequency											
Angle	11200 Hz	11800 Hz	12500 Hz	13200 Hz	14000 Hz	15000 Hz	16000 Hz	17000 Hz	18000 Hz	19000 Hz	20000 Hz
0°	0.00	0.00	0.01	0.01	0.01	0.02	0.00	-0.01	-0.03	0.00	0.00
5°	-0.04	-0.08	-0.07	-0.05	-0.06	-0.02	-0.06	-0.11	-0.06	-0.11	-0.10
10°	-0.06	-0.18	-0.22	-0.11	-0.17	-0.16	-0.22	-0.20	-0.21	-0.23	-0.22
15°	-0.08	-0.29	-0.39	-0.16	-0.25	-0.48	-0.44	-0.45	-0.28	-0.45	-0.38
20°	-0.24	-0.43	-0.41	-0.36	-0.31	-0.85	-0.82	-0.61	-0.64	-0.82	-0.73
25°	-0.61	-0.89	-0.65	-0.72	-0.75	-1.16	-1.14	-1.00	-0.86	-1.38	-1.16
30°	-0.79	-1.17	-1.09	-1.17	-0.88	-1.35	-1.64	-1.50	-1.39	-2.03	-1.84
35°	-1.05	-1.44	-1.17	-1.59	-1.25	-1.65	-2.25	-2.26	-1.80	-2.45	-2.49
40°	-1.53	-1.80	-1.96	-2.22	-1.55	-2.14	-2.72	-2.74	-2.40	-3.01	-3.35
45°	-1.63	-2.10	-2.21	-2.30	-2.27	-2.76	-3.05	-3.31	-3.31	-3.79	-4.03
50°	-2.02	-2.65	-2.42	-3.09	-3.02	-2.97	-3.69	-3.91	-4.27	-4.48	-4.60
55°	-2.86	-2.88	-3.24	-3.54	-3.52	-3.83	-4.44	-4.09	-4.93	-5.64	-5.60
60°	-2.89	-3.41	-3.48	-3.95	-4.01	-4.45	-5.21	-5.39	-5.41	-6.24	-6.64
65°	-3.30	-3.92	-3.69	-4.62	-4.21	-5.29	-5.94	-6.27	-6.41	-6.82	-7.74
70°	-3.71	-4.40	-4.21	-5.11	-4.81	-5.91	-6.51	-7.06	-7.44	-7.79	-8.47
75°	-4.22	-4.83	-4.74	-5.38	-5.58	-6.35	-7.26	-7.80	-8.08	-9.12	-9.44
80°	-4.05	-5.45	-5.26	-5.90	-5.92	-7.10	-7.95	-8.30	-8.57	-9.90	-10.61
85°	-4.91	-5.31	-6.12	-6.36	-6.48	-7.30	-8.81	-8.73	-9.40	-10.28	-11.37
90°	-5.35	-6.12	-6.32	-7.11	-7.05	-8.22	-8.88	-9.95	-9.94	-11.01	-12.53
95°	-5.91	-6.77	-6.85	-7.49	-7.60	-8.65	-9.90	-9.74	-11.02	-11.92	-13.13
100°	-6.38	-6.71	-7.98	-7.83	-7.94	-9.31	-10.17	-10.41	-11.57	-12.31	-13.78
105°	-6.54	-6.83	-8.03	-8.36	-9.15	-9.48	-10.85	-11.42	-12.07	-12.83	-14.30
110°	-6.56	-6.94	-7.93	-8.29	-9.58	-9.97	-11.75	-11.43	-12.75	-13.50	-15.18
115°	-6.51	-7.36	-8.10	-8.04	-9.08	-10.26	-12.41	-11.64	-13.24	-14.35	-15.63
120°	-6.53	-7.67	-7.98	-8.60	-9.42	-9.86	-11.55	-12.07	-13.83	-14.30	-16.73
125°	-6.99	-8.35	-8.03	-8.72	-9.61	-10.30	-11.68	-12.49	-12.25	-13.87	-15.74
130°	-6.72	-7.60	-7.80	-9.29	-10.31	-10.59	-11.70	-12.88	-12.71	-14.81	-16.10
135°	-7.09	-7.33	-7.85	-9.19	-9.14	-10.13	-11.80	-13.50	-13.14	-14.56	-16.79
140°	-7.74	-8.71	-9.32	-9.87	-9.07	-10.10	-11.79	-13.06	-12.39	-13.63	-16.41
145°	-6.55	-8.20	-8.96	-10.10	-10.05	-11.39	-13.35	-13.34	-13.07	-14.04	-16.93
150°	-5.43	-5.84	-6.42	-7.62	-8.65	-10.43	-11.88	-12.03	-12.73	-15.11	-17.44
155°	-5.97	-7.14	-7.63	-8.22	-8.05	-8.84	-9.38	-9.75	-11.03	-13.10	-14.84
160°	-4.40	-5.03	-5.67	-6.67	-7.37	-9.02	-10.62	-11.38	-11.90	-12.68	-13.48
165°	-7.04	-7.18	-7.02	-7.27	-7.08	-8.09	-9.09	-9.27	-10.30	-11.54	-12.98
170°	-10.82	-12.11	-12.68	-13.22	-12.90	-13.47	-14.25	-15.06	-14.65	-14.90	-15.25
175°	-7.42	-8.50	-9.37	-10.63	-11.19	-12.61	-13.79	-14.53	-15.81	-18.47	-19.51
180°	-5.90	-6.71	-7.28	-8.23	-8.77	-9.98	-10.91	-11.24	-12.25	-13.86	-15.13
185°	-7.28	-8.29	-9.01	-10.19	-11.02	-12.54	-13.50	-14.49	-15.96	-17.67	-19.85
190°	-10.86	-12.12	-12.84	-13.63	-14.06	-14.56	-15.21	-14.90	-15.40	-17.12	-17.01
195°	-7.63	-7.77	-7.66	-8.17	-8.07	-8.98	-9.89	-10.37	-11.11	-13.03	-14.09
200°	-4.57	-5.26	-5.87	-7.17	-7.96	-9.66	-11.22	-11.94	-12.54	-14.01	-13.97
205°	-6.10	-7.33	-8.24	-9.03	-8.90	-9.36	-9.78	-10.15	-10.97	-13.50	-14.77
210°	-5.93	-6.37	-7.07	-8.22	-9.00	-10.45	-11.32	-11.25	-12.14	-14.54	-17.24
215°	-6.88	-8.40	-9.53	-10.01	-9.73	-10.99	-12.88	-12.74	-13.06	-14.95	-16.37
220°	-8.08	-9.27	-9.79	-9.75	-8.71	-9.61	-11.11	-12.04	-11.83	-13.83	-16.22
225°	-7.40	-7.17	-7.49	-8.66	-8.64	-9.64	-11.32	-12.66	-13.18	-15.89	-17.21
230°	-6.47	-7.27	-7.50	-8.67	-10.09	-10.81	-11.90	-12.67	-12.29	-14.76	-15.05
235°	-6.66	-8.23	-8.37	-9.18	-10.14	-10.04	-10.70	-11.06	-11.92	-14.53	-15.18
240°	-6.90	-7.92	-8.35	-8.28	-8.74	-9.01	-10.53	-11.60	-13.98	-15.04	-16.38
245°	-6.60	-7.10	-8.09	-7.15	-8.50	-9.84	-11.96	-11.53	-12.85	-14.28	-14.79
250°	-6.62	-6.56	-7.41	-7.79	-9.58	-9.84	-11.06	-11.26	-12.11	-13.65	-14.45
255°	-6.35	-6.58	-7.55	-8.27	-8.86	-9.21	-9.99	-10.77	-11.74	-12.84	-13.72
260°	-6.24	-6.55	-8.00	-7.80	-7.32	-8.41	-9.63	-10.06	-11.31	-12.29	-12.93
265°	-5.86	-6.75	-6.81	-6.83	-6.94	-8.40	-9.32	-9.23	-10.03	-12.09	-12.71
270°	-5.38	-5.76	-5.60	-6.77	-7.11	-7.67	-8.03	-9.37	-9.87	-11.16	-11.63
275°	-4.43	-4.89	-5.90	-6.44	-6.00	-6.63	-8.26	-8.69	-8.87	-10.08	-11.22
280°	-3.78	-5.38	-5.33	-5.39	-5.38	-6.99	-7.49	-7.85	-8.20	-10.10	-10.02
285°	-4.29	-4.78	-4.29	-4.97	-5.69	-5.93	-6.50	-7.39	-7.82	-8.85	-9.30
290°	-3.71	-4.01	-3.86	-5.34	-4.41	-5.38	-6.15	-6.69	-6.90	-7.81	-8.52
295°	-3.01	-3.51	-3.82	-4.39	-3.69	-5.30	-5.44	-5.74	-6.00	-6.71	-7.57
300°	-2.56	-3.35	-3.35	-3.42	-3.98	-4.14	-4.67	-4.93	-5.13	-6.14	-6.56
305°	-2.86	-2.90	-2.84	-3.39	-3.59	-3.22	-4.14	-4.06	-4.46	-5.69	-5.36
310°	-2.06	-2.36	-2.02	-3.37	-2.37	-2.90	-3.45	-3.39	-3.84	-4.47	-4.52
315°	-1.58	-1.75	-2.24	-2.16	-1.97	-2.47	-2.68	-3.24	-3.06	-3.66	-3.77
320°	-1.31	-1.48	-2.15	-1.67	-1.63	-1.82	-2.28	-2.54	-2.08	-3.02	-3.24
325°	-0.82	-1.49	-1.04	-1.38	-1.33	-1.23	-2.12	-2.04	-1.67	-2.27	-2.44
330°	-0.55	-1.33	-0.74	-1.26	-0.73	-1.12	-1.58	-1.18	-1.31	-1.87	-1.84
335°	-0.59	-0.95	-0.27	-1.02	-0.30	-1.09	-0.92	-0.89	-0.70	-1.29	-1.13
340°	-0.36	-0.33	-0.14	-0.68	0.04	-0.95	-0.56	-0.65	-0.57	-0.84	-0.62
345°	-0.15	-0.18	-0.19	-0.35	-0.01	-0.56	-0.20	-0.43	-0.22	-0.42	-0.32
350°	-0.10	-0.12	-0.14	-0.16	-0.08	-0.22	-0.02	-0.13	-0.08	-0.17	-0.12
355°	-0.05	0.01	-0.04	-0.02	-0.03	-0.03	0.04	0.01	-0.03	-0.01	0.02

**Table A.27** Sensitivity variations of Microphone Type 4966, Microphone Preamplifier ZC-0032 and the analyzer with the microphone preamplifier mounted directly on the analyzer, at sound incidence angles within  $\pm\theta^\circ$  from the reference direction

Nominal Frequency	Exact Frequency	Max Variation $\pm 30^\circ$ dB	Max Variation $\pm 90^\circ$ dB	Max Variation $\pm 150^\circ$ dB
<b>500 Hz</b>	0.501 Hz	0.07	0.37	0.50
<b>630 Hz</b>	0.631 Hz	0.08	0.22	0.53
<b>800 Hz</b>	0.794 Hz	0.04	0.37	0.57
<b>1000 Hz</b>	1000 Hz	0.04	0.46	0.84
<b>1250 Hz</b>	1.259 Hz	0.05	0.29	1.03
<b>1600 Hz</b>	1.585 Hz	0.14	0.65	1.10
<b>2000 Hz</b>	1.995 Hz	0.30	0.73	1.38
2240 Hz	2.239 Hz	0.10	0.97	1.59
<b>2500 Hz</b>	2.512 Hz	0.31	1.09	1.79
2800 Hz	2.818 Hz	0.13	0.95	1.95
<b>3150 Hz</b>	3.162 Hz	0.43	1.17	1.83
3550 Hz	3.548 Hz	0.19	1.27	1.95
<b>4000 Hz</b>	3.981 Hz	0.23	1.52	2.32
4500 Hz	4.467 Hz	0.41	1.81	2.52
<b>5000 Hz</b>	5.012 Hz	0.32	1.22	2.51
5600 Hz	5.623 Hz	0.53	2.39	3.41
<b>6300 Hz</b>	6.310 Hz	0.86	2.87	4.09
7100 Hz	7.079 Hz	0.47	2.57	4.38
<b>8000 Hz</b>	7.943 Hz	0.49	3.47	5.40
8500 Hz	8.414 Hz	0.73	3.73	5.56
9000 Hz	8.913 Hz	0.72	4.03	6.34
9500 Hz	9.441 Hz	1.04	4.94	6.47
<b>10000 Hz</b>	10000 Hz	0.81	5.35	7.52
10600 Hz	10.593 Hz	0.82	5.36	7.81
11200 Hz	11.220 Hz	0.80	5.67	8.13
11800 Hz	11.885 Hz	1.35	6.14	9.29
<b>12500 Hz</b>	12.589 Hz	1.10	6.33	9.85
13200 Hz	13.335 Hz	1.35	7.12	10.34
14000 Hz	14.125 Hz	0.92	7.16	11.24
15000 Hz	14.962 Hz	1.37	8.23	12.52
<b>16000 Hz</b>	15.849 Hz	1.68	8.92	13.39
17000 Hz	16.788 Hz	1.53	9.98	14.32
18000 Hz	17.783 Hz	1.42	9.98	15.82
19000 Hz	18.836 Hz	2.03	11.38	16.92
<b>20000 Hz</b>	19.953 Hz	1.88	12.55	17.69

**Microphone Type 4966 for Hand-held Analyzer Types 2250, 2250-L and 2270 –  
Supplement to Instruction Manual BE 1712**

**Table A.28 Influence of Windscreen UA-1650 on directional response, with or without Microphone Preamplifier ZC-0032 connected to a microphone extension cable, 500 Hz – 3550 Hz**

Frequency												
Angle	500 Hz	630 Hz	800 Hz	1000 Hz	1250 Hz	1600 Hz	2000 Hz	2240 Hz	2500 Hz	2800 Hz	3150 Hz	3550 Hz
0°	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
5°	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01	-0.01
10°	-0.01	0.00	0.00	-0.01	-0.01	0.00	-0.01	0.00	0.00	0.00	0.00	0.00
15°	0.00	0.00	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	0.00	-0.01	0.01	0.00
20°	0.00	0.00	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	0.00	0.00	0.02	0.01
25°	-0.01	-0.01	0.00	-0.01	-0.01	-0.02	-0.01	-0.02	0.00	0.00	0.03	0.03
30°	-0.01	-0.01	0.00	-0.01	-0.02	-0.02	-0.02	-0.02	-0.01	0.00	0.04	0.04
35°	-0.01	-0.02	-0.01	-0.01	-0.03	-0.03	-0.03	-0.03	-0.02	0.01	0.05	0.06
40°	0.00	-0.01	-0.01	-0.02	-0.04	-0.04	-0.05	-0.03	-0.03	0.02	0.06	0.07
45°	-0.01	-0.02	-0.02	-0.02	-0.05	-0.05	-0.07	-0.04	-0.04	0.02	0.06	0.09
50°	0.00	-0.01	-0.02	-0.02	-0.06	-0.06	-0.08	-0.06	-0.05	0.01	0.07	0.11
55°	-0.01	-0.01	-0.02	-0.03	-0.07	-0.08	-0.10	-0.08	-0.06	-0.01	0.07	0.12
60°	-0.01	-0.01	-0.03	-0.04	-0.07	-0.10	-0.11	-0.11	-0.07	-0.01	0.07	0.14
65°	-0.01	-0.01	-0.03	-0.05	-0.08	-0.12	-0.12	-0.13	-0.10	-0.02	0.07	0.15
70°	-0.01	-0.01	-0.03	-0.05	-0.09	-0.13	-0.14	-0.14	-0.13	-0.04	0.06	0.15
75°	-0.02	-0.02	-0.04	-0.06	-0.09	-0.15	-0.16	-0.15	-0.15	-0.06	0.06	0.15
80°	-0.02	-0.02	-0.04	-0.06	-0.10	-0.16	-0.19	-0.17	-0.16	-0.09	0.04	0.14
85°	-0.03	-0.03	-0.04	-0.07	-0.11	-0.17	-0.22	-0.19	-0.18	-0.10	0.01	0.14
90°	-0.02	-0.02	-0.05	-0.07	-0.12	-0.18	-0.23	-0.22	-0.20	-0.11	-0.01	0.12
95°	-0.02	-0.03	-0.05	-0.07	-0.13	-0.18	-0.24	-0.24	-0.23	-0.14	-0.02	0.09
100°	-0.02	-0.03	-0.05	-0.07	-0.12	-0.19	-0.25	-0.25	-0.24	-0.17	-0.04	0.08
105°	-0.02	-0.02	-0.06	-0.07	-0.12	-0.19	-0.26	-0.26	-0.25	-0.19	-0.08	0.06
110°	-0.03	-0.03	-0.05	-0.08	-0.12	-0.19	-0.26	-0.27	-0.25	-0.19	-0.09	0.02
115°	-0.03	-0.04	-0.05	-0.07	-0.12	-0.19	-0.26	-0.27	-0.26	-0.18	-0.08	0.00
120°	-0.04	-0.04	-0.05	-0.07	-0.12	-0.19	-0.26	-0.26	-0.26	-0.18	-0.07	0.03
125°	-0.03	-0.03	-0.05	-0.07	-0.12	-0.18	-0.25	-0.25	-0.26	-0.18	-0.07	0.04
130°	-0.03	-0.04	-0.05	-0.07	-0.13	-0.18	-0.25	-0.24	-0.24	-0.17	-0.06	0.04
135°	-0.03	-0.04	-0.05	-0.07	-0.12	-0.17	-0.24	-0.23	-0.23	-0.15	-0.04	0.06
140°	-0.03	-0.04	-0.05	-0.07	-0.12	-0.16	-0.24	-0.22	-0.22	-0.13	-0.03	0.08
145°	-0.03	-0.04	-0.06	-0.08	-0.13	-0.15	-0.24	-0.22	-0.21	-0.12	-0.01	0.11
150°	-0.03	-0.04	-0.06	-0.08	-0.12	-0.15	-0.24	-0.22	-0.20	-0.12	0.00	0.12
155°	-0.03	-0.04	-0.06	-0.07	-0.13	-0.15	-0.23	-0.22	-0.20	-0.11	0.01	0.13
160°	-0.03	-0.04	-0.06	-0.07	-0.13	-0.15	-0.23	-0.21	-0.19	-0.11	0.02	0.13
165°	-0.03	-0.04	-0.06	-0.07	-0.13	-0.15	-0.23	-0.21	-0.19	-0.10	0.02	0.14
170°	-0.03	-0.04	-0.06	-0.07	-0.13	-0.15	-0.22	-0.21	-0.19	-0.10	0.03	0.15
175°	-0.04	-0.04	-0.06	-0.07	-0.13	-0.16	-0.22	-0.21	-0.19	-0.10	0.03	0.15
180°	-0.05	-0.05	-0.05	-0.07	-0.13	-0.16	-0.22	-0.21	-0.19	-0.10	0.03	0.15
185°	-0.03	-0.03	-0.06	-0.07	-0.12	-0.16	-0.23	-0.21	-0.19	-0.10	0.03	0.15
190°	-0.04	-0.05	-0.06	-0.07	-0.13	-0.16	-0.23	-0.22	-0.20	-0.11	0.02	0.14
195°	-0.03	-0.04	-0.06	-0.07	-0.13	-0.16	-0.23	-0.22	-0.20	-0.11	0.02	0.13
200°	-0.03	-0.04	-0.06	-0.07	-0.13	-0.16	-0.24	-0.22	-0.21	-0.12	0.01	0.13
205°	-0.03	-0.04	-0.06	-0.07	-0.13	-0.16	-0.24	-0.23	-0.21	-0.12	0.00	0.12
210°	-0.03	-0.04	-0.06	-0.07	-0.13	-0.16	-0.24	-0.23	-0.22	-0.12	0.00	0.11
215°	-0.03	-0.04	-0.06	-0.08	-0.13	-0.16	-0.25	-0.23	-0.22	-0.13	-0.01	0.10
220°	-0.04	-0.05	-0.06	-0.08	-0.13	-0.17	-0.25	-0.23	-0.22	-0.14	-0.03	0.08
225°	-0.04	-0.04	-0.06	-0.08	-0.13	-0.18	-0.25	-0.24	-0.23	-0.15	-0.05	0.05
230°	-0.03	-0.04	-0.06	-0.08	-0.13	-0.18	-0.25	-0.25	-0.24	-0.17	-0.07	0.04
235°	-0.03	-0.04	-0.06	-0.08	-0.13	-0.19	-0.26	-0.26	-0.26	-0.19	-0.07	0.04
240°	-0.03	-0.04	-0.06	-0.08	-0.12	-0.20	-0.26	-0.27	-0.26	-0.19	-0.07	0.03
245°	-0.03	-0.04	-0.06	-0.08	-0.13	-0.20	-0.27	-0.27	-0.26	-0.18	-0.08	0.00
250°	-0.03	-0.04	-0.05	-0.08	-0.13	-0.20	-0.26	-0.27	-0.26	-0.19	-0.09	0.01
255°	-0.03	-0.04	-0.06	-0.08	-0.13	-0.20	-0.26	-0.26	-0.25	-0.19	-0.08	0.06
260°	-0.02	-0.03	-0.05	-0.07	-0.13	-0.19	-0.25	-0.25	-0.25	-0.18	-0.04	0.08
265°	-0.03	-0.04	-0.05	-0.07	-0.13	-0.18	-0.24	-0.24	-0.23	-0.14	-0.01	0.09
270°	-0.02	-0.03	-0.05	-0.07	-0.12	-0.17	-0.23	-0.22	-0.21	-0.11	0.00	0.11
275°	-0.04	-0.04	-0.04	-0.07	-0.12	-0.16	-0.21	-0.20	-0.18	-0.10	0.01	0.15
280°	-0.02	-0.02	-0.04	-0.07	-0.10	-0.15	-0.19	-0.17	-0.16	-0.08	0.04	0.15
285°	-0.02	-0.03	-0.04	-0.06	-0.10	-0.14	-0.16	-0.15	-0.14	-0.05	0.06	0.15
290°	-0.02	-0.02	-0.04	-0.05	-0.09	-0.13	-0.14	-0.13	-0.12	-0.03	0.07	0.16
295°	-0.01	-0.01	-0.03	-0.05	-0.08	-0.11	-0.12	-0.12	-0.09	-0.01	0.07	0.16
300°	-0.02	-0.03	-0.03	-0.04	-0.07	-0.09	-0.11	-0.10	-0.06	0.00	0.08	0.15
305°	-0.01	-0.02	-0.03	-0.03	-0.06	-0.08	-0.09	-0.07	-0.05	0.01	0.08	0.14
310°	-0.01	-0.02	-0.02	-0.03	-0.05	-0.06	-0.08	-0.05	-0.04	0.02	0.08	0.12
315°	-0.02	-0.03	-0.02	-0.02	-0.04	-0.05	-0.06	-0.03	-0.03	0.03	0.07	0.11
320°	0.00	-0.01	-0.01	-0.02	-0.03	-0.03	-0.04	-0.02	-0.02	0.02	0.07	0.08
325°	-0.01	-0.01	-0.01	-0.01	-0.02	-0.02	-0.02	-0.02	0.00	0.02	0.07	0.07
330°	-0.01	-0.01	0.00	-0.01	-0.01	-0.02	-0.01	-0.01	0.01	0.02	0.06	0.06
335°	0.00	-0.01	0.00	0.00	-0.01	-0.01	0.00	-0.01	0.01	0.02	0.05	0.05
340°	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.03	0.04
345°	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.02	0.03	0.03
350°	-0.01	-0.01	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.02	0.02
355°	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.02	0.02

**Table A.29** Influence of Windscreen UA-1650 on directional response, with or without Microphone Preamplifier ZC-0032 connected to a microphone extension cable, 4000 Hz – 10600 Hz

Frequency												
Angle	4000 Hz	4500 Hz	5000 Hz	5600 Hz	6300 Hz	7100 Hz	8000 Hz	8500 Hz	9000 Hz	9500 Hz	10000 Hz	10600 Hz
0°	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02	-0.02	-0.01	-0.01	-0.01
5°	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02	-0.02	-0.01	0.00	0.00	-0.02
10°	-0.01	-0.01	-0.02	-0.01	0.01	0.00	-0.06	-0.04	-0.02	0.02	0.00	-0.05
15°	-0.01	-0.02	-0.03	-0.01	0.03	0.02	-0.11	-0.10	-0.03	0.06	0.01	-0.08
20°	0.00	-0.03	-0.06	-0.02	0.06	0.05	-0.20	-0.18	-0.05	0.08	0.03	-0.10
25°	0.00	-0.04	-0.09	-0.03	0.09	0.10	-0.27	-0.26	-0.08	0.10	0.05	-0.11
30°	0.01	-0.05	-0.13	-0.06	0.10	0.14	-0.31	-0.36	-0.17	0.06	0.07	-0.11
35°	0.02	-0.06	-0.16	-0.08	0.12	0.19	-0.34	-0.50	-0.28	0.03	0.12	-0.07
40°	0.03	-0.07	-0.19	-0.11	0.15	0.28	-0.37	-0.56	-0.38	-0.04	0.08	-0.05
45°	0.04	-0.07	-0.24	-0.18	0.14	0.34	-0.32	-0.62	-0.54	-0.17	0.06	0.03
50°	0.06	-0.08	-0.28	-0.24	0.11	0.35	-0.25	-0.65	-0.59	-0.30	-0.03	0.00
55°	0.09	-0.07	-0.30	-0.27	0.10	0.43	-0.14	-0.58	-0.67	-0.40	-0.11	-0.01
60°	0.11	-0.06	-0.31	-0.34	0.02	0.42	-0.04	-0.51	-0.64	-0.47	-0.25	-0.08
65°	0.12	-0.05	-0.33	-0.40	0.00	0.41	0.05	-0.40	-0.61	-0.48	-0.30	-0.20
70°	0.14	-0.03	-0.33	-0.40	-0.04	0.35	0.11	-0.34	-0.51	-0.47	-0.32	-0.23
75°	0.15	-0.01	-0.32	-0.43	-0.10	0.29	0.10	-0.28	-0.48	-0.40	-0.32	-0.22
80°	0.15	-0.01	-0.32	-0.44	-0.10	0.24	0.01	-0.28	-0.46	-0.39	-0.25	-0.19
85°	0.14	-0.01	-0.33	-0.45	-0.12	0.23	-0.02	-0.35	-0.46	-0.40	-0.24	-0.13
90°	0.14	-0.02	-0.35	-0.47	-0.12	0.22	-0.17	-0.36	-0.51	-0.39	-0.24	-0.08
95°	0.12	-0.04	-0.38	-0.50	-0.15	0.26	-0.15	-0.42	-0.53	-0.42	-0.25	-0.08
100°	0.07	-0.08	-0.42	-0.55	-0.16	0.28	-0.22	-0.46	-0.54	-0.45	-0.27	-0.11
105°	0.05	-0.13	-0.47	-0.60	-0.20	0.32	-0.21	-0.46	-0.60	-0.49	-0.31	-0.18
110°	0.03	-0.17	-0.55	-0.68	-0.23	0.33	-0.22	-0.52	-0.63	-0.57	-0.42	-0.23
115°	-0.01	-0.20	-0.62	-0.77	-0.33	0.32	-0.22	-0.57	-0.76	-0.69	-0.49	-0.31
120°	-0.01	-0.25	-0.65	-0.84	-0.42	0.25	-0.26	-0.66	-0.86	-0.83	-0.67	-0.33
125°	0.02	-0.23	-0.68	-0.89	-0.47	0.16	-0.37	-0.82	-1.06	-1.03	-0.76	-0.42
130°	0.03	-0.20	-0.64	-0.88	-0.52	0.10	-0.43	-0.95	-1.27	-1.25	-0.96	-0.62
135°	0.05	-0.18	-0.60	-0.79	-0.45	0.09	-0.40	-0.94	-1.31	-1.31	-1.08	-0.76
140°	0.08	-0.15	-0.57	-0.77	-0.40	0.12	-0.35	-0.85	-1.12	-1.13	-0.93	-0.75
145°	0.10	-0.11	-0.52	-0.71	-0.36	0.13	-0.32	-0.79	-0.99	-0.86	-0.64	-0.52
150°	0.13	-0.07	-0.46	-0.65	-0.30	0.17	-0.28	-0.73	-0.92	-0.75	-0.47	-0.38
155°	0.15	-0.05	-0.43	-0.60	-0.25	0.20	-0.23	-0.63	-0.76	-0.59	-0.38	-0.31
160°	0.16	-0.03	-0.41	-0.57	-0.21	0.22	-0.19	-0.53	-0.63	-0.45	-0.24	-0.26
165°	0.16	-0.02	-0.39	-0.55	-0.20	0.25	-0.14	-0.48	-0.55	-0.35	-0.17	-0.20
170°	0.17	0.00	-0.38	-0.53	-0.21	0.27	-0.11	-0.44	-0.48	-0.29	-0.17	-0.17
175°	0.18	0.01	-0.36	-0.52	-0.21	0.27	-0.10	-0.41	-0.45	-0.27	-0.15	-0.19
180°	0.18	0.01	-0.37	-0.53	-0.22	0.27	-0.11	-0.41	-0.45	-0.29	-0.16	-0.21
185°	0.17	0.00	-0.37	-0.54	-0.23	0.26	-0.13	-0.44	-0.48	-0.32	-0.19	-0.23
190°	0.16	-0.01	-0.39	-0.56	-0.24	0.25	-0.15	-0.48	-0.52	-0.34	-0.21	-0.21
195°	0.15	-0.03	-0.41	-0.58	-0.23	0.25	-0.15	-0.50	-0.57	-0.37	-0.20	-0.21
200°	0.14	-0.04	-0.43	-0.59	-0.23	0.24	-0.18	-0.55	-0.66	-0.48	-0.27	-0.28
205°	0.13	-0.05	-0.45	-0.61	-0.27	0.20	-0.24	-0.64	-0.77	-0.60	-0.37	-0.30
210°	0.12	-0.08	-0.48	-0.66	-0.32	0.19	-0.29	-0.73	-0.92	-0.75	-0.47	-0.37
215°	0.10	-0.12	-0.53	-0.73	-0.37	0.16	-0.32	-0.79	-1.01	-0.88	-0.63	-0.49
220°	0.07	-0.15	-0.58	-0.79	-0.40	0.13	-0.35	-0.85	-1.14	-1.15	-0.93	-0.72
225°	0.04	-0.18	-0.61	-0.81	-0.46	0.10	-0.39	-0.95	-1.34	-1.34	-1.10	-0.74
230°	0.03	-0.20	-0.65	-0.89	-0.52	0.10	-0.43	-0.96	-1.30	-1.30	-1.01	-0.64
235°	0.03	-0.24	-0.70	-0.91	-0.48	0.14	-0.36	-0.85	-1.13	-1.09	-0.81	-0.43
240°	-0.01	-0.26	-0.67	-0.87	-0.44	0.24	-0.28	-0.68	-0.91	-0.89	-0.70	-0.33
245°	-0.02	-0.20	-0.63	-0.81	-0.35	0.30	-0.21	-0.57	-0.78	-0.72	-0.50	-0.30
250°	0.03	-0.18	-0.57	-0.71	-0.27	0.30	-0.20	-0.51	-0.66	-0.61	-0.45	-0.23
255°	0.06	-0.15	-0.49	-0.62	-0.22	0.30	-0.19	-0.47	-0.62	-0.52	-0.33	-0.18
260°	0.07	-0.08	-0.43	-0.57	-0.18	0.27	-0.20	-0.46	-0.56	-0.49	-0.29	-0.10
265°	0.11	-0.05	-0.39	-0.52	-0.16	0.27	-0.15	-0.43	-0.55	-0.45	-0.26	-0.06
270°	0.14	-0.03	-0.36	-0.48	-0.13	0.23	-0.14	-0.36	-0.54	-0.42	-0.26	-0.07
275°	0.14	-0.01	-0.34	-0.46	-0.12	0.25	-0.01	-0.35	-0.48	-0.42	-0.26	-0.12
280°	0.15	-0.01	-0.32	-0.44	-0.10	0.26	0.04	-0.29	-0.48	-0.42	-0.27	-0.19
285°	0.16	-0.01	-0.32	-0.43	-0.09	0.32	0.11	-0.29	-0.50	-0.43	-0.33	-0.21
290°	0.15	-0.02	-0.33	-0.40	-0.03	0.36	0.12	-0.35	-0.53	-0.49	-0.33	-0.21
295°	0.14	-0.03	-0.33	-0.39	0.02	0.43	0.05	-0.40	-0.63	-0.50	-0.30	-0.19
300°	0.12	-0.05	-0.31	-0.33	0.05	0.43	-0.01	-0.52	-0.66	-0.49	-0.25	-0.07
305°	0.10	-0.06	-0.29	-0.26	0.12	0.45	-0.14	-0.59	-0.69	-0.41	-0.11	0.00
310°	0.08	-0.07	-0.26	-0.23	0.13	0.39	-0.24	-0.65	-0.61	-0.30	-0.03	0.00
315°	0.06	-0.06	-0.22	-0.17	0.16	0.37	-0.31	-0.63	-0.54	-0.17	0.06	0.03
320°	0.05	-0.05	-0.17	-0.10	0.17	0.29	-0.37	-0.56	-0.38	-0.04	0.08	-0.05
325°	0.03	-0.04	-0.14	-0.06	0.14	0.20	-0.34	-0.49	-0.27	0.04	0.13	-0.07
330°	0.02	-0.03	-0.11	-0.03	0.12	0.16	-0.30	-0.35	-0.16	0.07	0.08	-0.10
335°	0.02	-0.02	-0.07	-0.01	0.11	0.12	-0.26	-0.24	-0.07	0.11	0.06	-0.09
340°	0.02	0.00	-0.04	0.01	0.09	0.07	-0.18	-0.16	-0.03	0.11	0.05	-0.08
345°	0.01	0.01	-0.01	0.01	0.06	0.04	-0.09	-0.08	-0.01	0.08	0.03	-0.06
350°	0.01	0.01	0.01	0.02	0.04	0.02	-0.03	-0.03	0.01	0.05	0.02	-0.03
355°	0.01	0.01	0.01	0.02	0.03	0.02	0.00	0.00	0.02	0.03	0.02	0.00

**Microphone Type 4966 for Hand-held Analyzer Types 2250, 2250-L and 2270 –  
Supplement to Instruction Manual BE 1712**

**Table A.30 Influence of Windscreen UA-1650 on directional response, with or without Microphone Preamplifier ZC-0032 connected to a microphone extension cable, 11200 Hz – 20000 Hz**

Frequency												
Angle	11200 Hz	11800 Hz	<b>12500 Hz</b>	13200 Hz	14000 Hz	15000 Hz	<b>16000 Hz</b>	17000 Hz	18000 Hz	19000 Hz	<b>20000 Hz</b>	
0°	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02	
5°	-0.03	-0.02	0.00	-0.01	-0.03	-0.01	0.00	-0.01	-0.02	-0.01	-0.03	
10°	-0.08	-0.05	0.00	-0.03	-0.09	-0.02	0.01	-0.02	-0.04	-0.02	-0.08	
15°	-0.16	-0.11	0.01	-0.05	-0.17	-0.09	0.04	-0.03	-0.11	-0.05	-0.15	
20°	-0.25	-0.18	0.00	-0.09	-0.26	-0.20	0.04	-0.06	-0.20	-0.12	-0.22	
25°	-0.35	-0.25	-0.01	-0.08	-0.36	-0.30	-0.07	-0.02	-0.27	-0.25	-0.31	
30°	-0.46	-0.39	-0.09	-0.07	-0.38	-0.46	-0.16	-0.04	-0.28	-0.33	-0.37	
35°	-0.49	-0.50	-0.18	-0.09	-0.40	-0.51	-0.33	-0.06	-0.21	-0.36	-0.40	
40°	-0.52	-0.63	-0.30	-0.11	-0.33	-0.54	-0.40	-0.17	-0.08	-0.25	-0.37	
45°	-0.46	-0.65	-0.41	-0.18	-0.31	-0.49	-0.40	-0.29	-0.02	-0.09	-0.30	
50°	-0.43	-0.68	-0.53	-0.29	-0.29	-0.40	-0.38	-0.40	-0.16	-0.04	-0.29	
55°	-0.36	-0.64	-0.57	-0.39	-0.32	-0.41	-0.39	-0.47	-0.39	-0.19	-0.36	
60°	-0.38	-0.61	-0.58	-0.52	-0.43	-0.47	-0.46	-0.52	-0.58	-0.41	-0.44	
65°	-0.45	-0.66	-0.63	-0.62	-0.55	-0.56	-0.53	-0.54	-0.65	-0.50	-0.53	
70°	-0.51	-0.71	-0.70	-0.73	-0.66	-0.60	-0.56	-0.58	-0.63	-0.54	-0.81	
75°	-0.51	-0.74	-0.73	-0.79	-0.80	-0.65	-0.59	-0.66	-0.71	-0.66	-0.90	
80°	-0.45	-0.69	-0.73	-0.78	-0.90	-0.82	-0.74	-0.82	-0.80	-0.79	-0.85	
85°	-0.37	-0.58	-0.70	-0.78	-0.94	-1.02	-1.01	-1.04	-0.80	-0.66	-0.77	
90°	-0.32	-0.51	-0.64	-0.81	-0.95	-1.08	-1.14	-1.13	-0.83	-0.54	-0.91	
95°	-0.29	-0.54	-0.68	-0.90	-0.91	-1.00	-0.93	-0.94	-0.81	-0.84	-1.70	
100°	-0.33	-0.57	-0.75	-1.07	-0.94	-0.81	-0.65	-0.66	-0.86	-1.27	-1.98	
105°	-0.36	-0.57	-0.74	-1.03	-1.05	-0.87	-0.57	-0.61	-0.88	-1.35	-1.35	
110°	-0.39	-0.54	-0.61	-0.89	-1.09	-0.91	-0.80	-0.99	-0.99	-1.05	-0.90	
115°	-0.42	-0.49	-0.51	-0.74	-1.10	-0.94	-0.86	-1.05	-1.12	-1.27	-1.01	
120°	-0.40	-0.44	-0.50	-0.79	-1.10	-0.84	-0.82	-0.88	-1.32	-1.22	-1.30	
125°	-0.48	-0.55	-0.64	-0.90	-1.04	-0.71	-0.58	-0.76	-1.30	-1.14	-1.29	
130°	-0.70	-0.76	-0.96	-1.32	-1.09	-0.55	-0.48	-0.79	-0.94	-0.87	-0.95	
135°	-0.92	-1.18	-1.61	-1.97	-1.32	-0.81	-0.82	-1.58	-0.59	-0.52	-0.82	
140°	-0.99	-1.42	-1.93	-2.12	-1.62	-1.54	-1.96	-2.68	-1.05	-0.71	-1.78	
145°	-0.86	-1.33	-1.70	-1.71	-1.58	-1.79	-2.53	-2.83	-1.56	-1.77	-3.84	
150°	-0.80	-1.21	-1.29	-1.12	-1.14	-1.61	-2.29	-2.00	-1.49	-2.18	-4.05	
155°	-0.74	-1.17	-1.15	-0.84	-0.84	-1.54	-1.89	-1.21	-0.94	-2.22	-2.77	
160°	-0.71	-1.02	-0.88	-0.57	-0.77	-1.49	-1.73	-0.86	-0.77	-2.32	-1.91	
165°	-0.67	-0.89	-0.66	-0.40	-0.68	-1.44	-1.37	-0.53	-0.64	-2.22	-1.47	
170°	-0.58	-0.79	-0.47	-0.23	-0.59	-1.32	-1.16	-0.33	-0.57	-2.09	-1.28	
175°	-0.57	-0.74	-0.47	-0.21	-0.58	-1.19	-1.07	-0.25	-0.43	-1.93	-1.08	
180°	-0.60	-0.75	-0.48	-0.25	-0.60	-1.21	-1.08	-0.30	-0.43	-1.95	-1.03	
185°	-0.62	-0.80	-0.54	-0.29	-0.64	-1.28	-1.22	-0.39	-0.49	-2.08	-1.24	
190°	-0.61	-0.83	-0.51	-0.24	-0.60	-1.36	-1.25	-0.37	-0.56	-2.18	-1.38	
195°	-0.67	-0.92	-0.70	-0.43	-0.70	-1.50	-1.54	-0.64	-0.62	-2.39	-1.76	
200°	-0.73	-1.05	-0.95	-0.59	-0.74	-1.52	-1.88	-0.90	-0.69	-2.49	-2.34	
205°	-0.73	-1.21	-1.24	-0.88	-0.83	-1.57	-2.09	-1.29	-0.79	-2.26	-3.02	
210°	-0.80	-1.26	-1.40	-1.15	-1.08	-1.56	-2.44	-2.15	-1.37	-2.11	-4.31	
215°	-0.82	-1.36	-1.80	-1.80	-1.54	-1.74	-2.59	-3.04	-1.46	-1.56	-4.08	
220°	-0.96	-1.42	-2.02	-2.24	-1.68	-1.46	-1.99	-3.04	-1.21	-0.72	-2.45	
225°	-0.89	-1.22	-1.73	-2.11	-1.49	-0.77	-0.94	-1.76	-0.53	-0.53	-1.05	
230°	-0.68	-0.84	-1.08	-1.40	-1.11	-0.54	-0.56	-0.85	-0.82	-0.94	-1.40	
235°	-0.47	-0.57	-0.71	-0.96	-1.03	-0.71	-0.71	-0.85	-1.14	-0.98	-2.13	
240°	-0.39	-0.46	-0.56	-0.87	-1.08	-0.81	-0.99	-1.11	-1.14	-0.86	-1.81	
245°	-0.41	-0.52	-0.59	-0.81	-1.06	-0.85	-1.00	-1.36	-1.03	-0.95	-1.15	
250°	-0.37	-0.57	-0.70	-0.97	-1.05	-0.80	-0.82	-1.30	-1.04	-0.75	-0.95	
255°	-0.33	-0.59	-0.82	-1.15	-1.07	-0.76	-0.55	-0.81	-0.97	-1.25	-1.60	
260°	-0.29	-0.57	-0.83	-1.19	-0.98	-0.73	-0.65	-0.77	-0.88	-1.16	-2.36	
265°	-0.26	-0.53	-0.76	-1.02	-0.95	-0.95	-1.06	-0.83	-0.71	-1.96		
270°	-0.29	-0.51	-0.71	-0.90	-0.97	-1.02	-1.19	-1.32	-0.86	-0.41	-1.04	
275°	-0.35	-0.59	-0.75	-0.86	-0.94	-0.95	-1.07	-1.21	-0.89	-0.59	-0.90	
280°	-0.43	-0.70	-0.78	-0.86	-0.90	-0.77	-0.77	-0.93	-0.86	-0.76	-1.00	
285°	-0.50	-0.74	-0.80	-0.87	-0.80	-0.63	-0.61	-0.73	-0.71	-0.60	-1.07	
290°	-0.50	-0.72	-0.77	-0.80	-0.66	-0.59	-0.60	-0.65	-0.61	-0.54	-0.92	
295°	-0.44	-0.67	-0.70	-0.66	-0.53	-0.55	-0.57	-0.60	-0.65	-0.53	-0.66	
300°	-0.37	-0.63	-0.62	-0.52	-0.39	-0.46	-0.50	-0.56	-0.60	-0.46	-0.49	
305°	-0.37	-0.66	-0.59	-0.38	-0.29	-0.41	-0.43	-0.51	-0.42	-0.22	-0.40	
310°	-0.44	-0.70	-0.54	-0.28	-0.27	-0.42	-0.42	-0.44	-0.17	-0.06	-0.32	
315°	-0.48	-0.66	-0.41	-0.17	-0.32	-0.52	-0.45	-0.34	-0.03	-0.12	-0.36	
320°	-0.52	-0.63	-0.29	-0.10	-0.35	-0.57	-0.45	-0.20	-0.08	-0.29	-0.42	
325°	-0.48	-0.49	-0.17	-0.09	-0.40	-0.53	-0.37	-0.08	-0.22	-0.40	-0.44	
330°	-0.45	-0.37	-0.07	-0.07	-0.39	-0.48	-0.19	-0.05	-0.29	-0.36	-0.40	
335°	-0.34	-0.23	0.01	-0.07	-0.35	-0.32	-0.08	-0.01	-0.28	-0.27	-0.33	
340°	-0.23	-0.15	0.02	-0.07	-0.25	-0.21	0.04	-0.03	-0.20	-0.13	-0.23	
345°	-0.14	-0.08	0.03	-0.03	-0.17	-0.10	0.05	-0.02	-0.11	-0.05	-0.14	
350°	-0.06	-0.03	0.03	-0.01	-0.09	-0.02	0.02	-0.01	-0.03	-0.02	-0.06	
355°	-0.01	0.00	0.02	0.01	-0.01	0.01	0.02	0.01	0.00	0.00	0.00	

**Table A.31** Directional response for Windscreen UA-1650, Microphone Type 4966 and Microphone Preamplifier ZC-0032, with the microphone preamplifier connected to a microphone extension cable, 500 Hz – 3550 Hz

**Microphone Type 4966 for Hand-held Analyzer Types 2250, 2250-L and 2270 –  
Supplement to Instruction Manual BE 1712**

**Table A.32** Directional response for Windscreen UA-1650, Microphone Type 4966 and Microphone Preamplifier ZC-0032, with the microphone preamplifier connected to a microphone extension cable, 4000 Hz – 10600 Hz

Frequency												
Angle	4000 Hz	4500 Hz	5000 Hz	5600 Hz	6300 Hz	7100 Hz	8000 Hz	8500 Hz	9000 Hz	9500 Hz	10000 Hz	10600 Hz
0°	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
5°	-0.02	-0.02	-0.02	-0.02	-0.02	-0.03	-0.05	-0.04	-0.04	-0.03	-0.03	-0.05
10°	-0.03	-0.05	-0.06	-0.06	-0.04	-0.07	-0.13	-0.12	-0.10	-0.06	-0.09	-0.15
15°	-0.05	-0.07	-0.10	-0.09	-0.06	-0.09	-0.24	-0.24	-0.18	-0.10	-0.16	-0.26
20°	-0.08	-0.12	-0.17	-0.15	-0.10	-0.14	-0.41	-0.41	-0.29	-0.18	-0.25	-0.40
25°	-0.13	-0.20	-0.28	-0.26	-0.18	-0.22	-0.64	-0.65	-0.51	-0.36	-0.45	-0.64
30°	-0.19	-0.28	-0.40	-0.39	-0.29	-0.31	-0.83	-0.92	-0.77	-0.59	-0.62	-0.85
35°	-0.23	-0.35	-0.51	-0.50	-0.38	-0.39	-1.02	-1.24	-1.08	-0.82	-0.80	-1.06
40°	-0.29	-0.45	-0.65	-0.66	-0.49	-0.49	-1.27	-1.53	-1.43	-1.17	-1.13	-1.35
45°	-0.36	-0.55	-0.81	-0.85	-0.65	-0.60	-1.42	-1.81	-1.83	-1.56	-1.45	-1.59
50°	-0.43	-0.66	-0.97	-1.05	-0.85	-0.78	-1.58	-2.09	-2.16	-1.99	-1.86	-1.97
55°	-0.49	-0.76	-1.11	-1.22	-1.02	-0.90	-1.71	-2.28	-2.51	-2.39	-2.26	-2.33
60°	-0.56	-0.86	-1.26	-1.45	-1.29	-1.13	-1.86	-2.48	-2.77	-2.77	-2.74	-2.76
65°	-0.63	-0.95	-1.41	-1.68	-1.52	-1.37	-2.03	-2.65	-3.03	-3.10	-3.13	-3.25
70°	-0.70	-1.04	-1.54	-1.85	-1.76	-1.67	-2.24	-2.88	-3.24	-3.41	-3.49	-3.64
75°	-0.75	-1.11	-1.65	-2.03	-1.99	-1.94	-2.51	-3.10	-3.51	-3.67	-3.83	-3.99
80°	-0.82	-1.20	-1.76	-2.17	-2.16	-2.20	-2.85	-3.37	-3.78	-3.98	-4.11	-4.34
85°	-0.91	-1.29	-1.88	-2.32	-2.34	-2.40	-3.13	-3.71	-4.09	-4.32	-4.46	-4.68
90°	-0.97	-1.37	-1.98	-2.43	-2.47	-2.58	-3.48	-3.96	-4.42	-4.62	-4.80	-5.00
95°	-1.06	-1.46	-2.09	-2.56	-2.61	-2.68	-3.65	-4.22	-4.66	-4.90	-5.09	-5.31
100°	-1.16	-1.57	-2.22	-2.72	-2.75	-2.81	-3.89	-4.45	-4.87	-5.15	-5.35	-5.61
105°	-1.21	-1.66	-2.31	-2.82	-2.86	-2.87	-4.00	-4.60	-5.09	-5.37	-5.61	-5.92
110°	-1.28	-1.74	-2.43	-2.94	-2.94	-2.92	-4.11	-4.77	-5.27	-5.63	-5.92	-6.21
115°	-1.38	-1.82	-2.54	-3.07	-3.07	-2.97	-4.15	-4.88	-5.46	-5.82	-6.09	-6.40
120°	-1.42	-1.90	-2.61	-3.16	-3.20	-3.07	-4.22	-5.00	-5.60	-6.01	-6.32	-6.49
125°	-1.41	-1.93	-2.69	-3.27	-3.31	-3.21	-4.39	-5.20	-5.83	-6.23	-6.42	-6.58
130°	-1.41	-1.92	-2.70	-3.33	-3.43	-3.35	-4.50	-5.37	-6.07	-6.46	-6.62	-6.76
135°	-1.37	-1.88	-2.64	-3.23	-3.36	-3.37	-4.51	-5.42	-6.18	-6.59	-6.81	-6.97
140°	-1.34	-1.83	-2.57	-3.16	-3.25	-3.28	-4.41	-5.28	-5.96	-6.40	-6.66	-6.98
145°	-1.27	-1.76	-2.49	-3.07	-3.20	-3.25	-4.36	-5.20	-5.79	-6.08	-6.33	-6.69
150°	-1.20	-1.68	-2.41	-2.99	-3.12	-3.19	-4.27	-5.08	-5.66	-5.89	-6.06	-6.45
155°	-1.08	-1.55	-2.26	-2.83	-2.96	-3.08	-4.18	-4.95	-5.47	-5.73	-5.97	-6.40
160°	-0.97	-1.41	-2.09	-2.62	-2.71	-2.82	-3.89	-4.61	-5.12	-5.37	-5.64	-6.17
165°	-0.87	-1.27	-1.93	-2.41	-2.48	-2.53	-3.51	-4.19	-4.64	-4.85	-5.12	-5.63
170°	-0.78	-1.17	-1.80	-2.25	-2.31	-2.28	-3.20	-3.84	-4.22	-4.39	-4.67	-5.10
175°	-0.74	-1.10	-1.72	-2.17	-2.22	-2.16	-3.04	-3.64	-3.99	-4.16	-4.41	-4.85
180°	-0.73	-1.10	-1.71	-2.16	-2.20	-2.14	-3.01	-3.60	-3.95	-4.12	-4.36	-4.80
185°	-0.76	-1.13	-1.75	-2.21	-2.27	-2.21	-3.12	-3.73	-4.09	-4.28	-4.54	-4.99
190°	-0.82	-1.21	-1.85	-2.34	-2.41	-2.39	-3.36	-4.01	-4.41	-4.61	-4.90	-5.35
195°	-0.91	-1.32	-1.99	-2.52	-2.60	-2.63	-3.66	-4.36	-4.83	-5.06	-5.35	-5.87
200°	-1.03	-1.48	-2.19	-2.75	-2.86	-2.95	-4.03	-4.77	-5.28	-5.55	-5.82	-6.35
205°	-1.17	-1.64	-2.38	-2.95	-3.09	-3.19	-4.29	-5.07	-5.60	-5.87	-6.11	-6.55
210°	-1.25	-1.74	-2.49	-3.08	-3.23	-3.28	-4.43	-5.24	-5.83	-6.09	-6.27	-6.66
215°	-1.34	-1.84	-2.60	-3.20	-3.31	-3.33	-4.46	-5.29	-5.91	-6.21	-6.42	-6.78
220°	-1.38	-1.88	-2.63	-3.23	-3.31	-3.35	-4.51	-5.39	-6.10	-6.55	-6.83	-7.14
225°	-1.42	-1.94	-2.73	-3.35	-3.48	-3.48	-4.62	-5.54	-6.32	-6.74	-6.95	-7.08
230°	-1.45	-1.97	-2.77	-3.41	-3.50	-3.42	-4.59	-5.47	-6.20	-6.63	-6.80	-6.93
235°	-1.45	-1.99	-2.77	-3.37	-3.39	-3.31	-4.46	-5.32	-6.00	-6.41	-6.60	-6.75
240°	-1.46	-1.97	-2.69	-3.27	-3.29	-3.16	-4.35	-5.12	-5.77	-6.20	-6.50	-6.66
245°	-1.42	-1.86	-2.58	-3.13	-3.13	-3.04	-4.21	-4.96	-5.59	-5.97	-6.24	-6.56
250°	-1.33	-1.80	-2.52	-3.03	-3.05	-3.02	-4.18	-4.85	-5.39	-5.76	-6.05	-6.32
255°	-1.26	-1.74	-2.41	-2.92	-2.97	-2.97	-4.07	-4.69	-5.21	-5.50	-5.73	-6.03
260°	-1.21	-1.62	-2.28	-2.78	-2.83	-2.88	-3.94	-4.52	-4.97	-5.28	-5.48	-5.73
265°	-1.10	-1.50	-2.14	-2.61	-2.66	-2.72	-3.70	-4.29	-4.74	-5.00	-5.20	-5.41
270°	-1.01	-1.42	-2.03	-2.49	-2.53	-2.62	-3.51	-4.02	-4.51	-4.71	-4.90	-5.07
275°	-0.94	-1.31	-1.91	-2.34	-2.36	-2.40	-3.14	-3.75	-4.15	-4.40	-4.56	-4.76
280°	-0.86	-1.25	-1.82	-2.23	-2.23	-2.24	-2.89	-3.44	-3.87	-4.08	-4.20	-4.42
285°	-0.79	-1.16	-1.70	-2.08	-2.04	-1.97	-2.55	-3.16	-3.60	-3.77	-3.93	-4.08
290°	-0.72	-1.06	-1.57	-1.88	-1.78	-1.69	-2.28	-2.94	-3.33	-3.50	-3.58	-3.72
295°	-0.65	-0.97	-1.45	-1.71	-1.54	-1.40	-2.08	-2.70	-3.11	-3.18	-3.20	-3.32
300°	-0.58	-0.87	-1.28	-1.48	-1.29	-1.15	-1.87	-2.53	-2.83	-2.84	-2.79	-2.82
305°	-0.51	-0.78	-1.14	-1.26	-1.05	-0.93	-1.77	-2.35	-2.59	-2.47	-2.34	-2.41
310°	-0.43	-0.67	-0.97	-1.06	-0.85	-0.77	-1.60	-2.12	-2.20	-2.03	-1.90	-2.03
315°	-0.37	-0.57	-0.82	-0.87	-0.67	-0.61	-1.45	-1.86	-1.88	-1.61	-1.49	-1.65
320°	-0.29	-0.45	-0.64	-0.66	-0.49	-0.49	-1.28	-1.54	-1.45	-1.19	-1.16	-1.39
325°	-0.23	-0.36	-0.52	-0.51	-0.39	-0.42	-1.07	-1.27	-1.12	-0.87	-0.85	-1.13
330°	-0.18	-0.28	-0.40	-0.38	-0.29	-0.31	-0.85	-0.95	-0.80	-0.62	-0.66	-0.90
335°	-0.13	-0.19	-0.28	-0.26	-0.18	-0.23	-0.66	-0.67	-0.53	-0.39	-0.48	-0.67
340°	-0.08	-0.12	-0.17	-0.15	-0.10	-0.15	-0.43	-0.43	-0.32	-0.21	-0.29	-0.45
345°	-0.04	-0.06	-0.09	-0.08	-0.05	-0.09	-0.24	-0.24	-0.18	-0.11	-0.17	-0.28
350°	-0.02	-0.03	-0.04	-0.03	-0.02	-0.05	-0.11	-0.12	-0.08	-0.05	-0.08	-0.14
355°	0.01	0.00	0.00	0.01	0.01	0.00	-0.01	-0.02	0.00	0.01	0.00	-0.02

**Table A.33** Directional response for Windscreen UA-1650, Microphone Type 4966 and Microphone Preamplifier ZC-0032 with the microphone preamplifier connected to a microphone extension cable, 11200 Hz – 20000 Hz

Frequency												
Angle	11200 Hz	11800 Hz	<b>12500 Hz</b>	13200 Hz	14000 Hz	15000 Hz	<b>16000 Hz</b>	17000 Hz	18000 Hz	19000 Hz	<b>20000 Hz</b>	
0°	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02	
5°	-0.06	-0.06	-0.05	-0.06	-0.07	-0.05	-0.05	-0.06	-0.06	-0.05	-0.08	
10°	-0.19	-0.16	-0.11	-0.15	-0.22	-0.16	-0.13	-0.18	-0.21	-0.20	-0.27	
15°	-0.35	-0.31	-0.21	-0.29	-0.43	-0.36	-0.25	-0.35	-0.45	-0.42	-0.55	
20°	-0.57	-0.52	-0.38	-0.49	-0.70	-0.68	-0.48	-0.63	-0.82	-0.80	-0.96	
25°	-0.92	-0.86	-0.66	-0.79	-1.12	-1.11	-0.95	-0.96	-1.29	-1.35	-1.50	
30°	-1.25	-1.24	-1.00	-1.05	-1.43	-1.60	-1.39	-1.37	-1.73	-1.90	-2.06	
35°	-1.55	-1.64	-1.41	-1.41	-1.81	-2.03	-1.97	-1.85	-2.15	-2.47	-2.70	
40°	-1.92	-2.14	-1.91	-1.83	-2.19	-2.53	-2.54	-2.48	-2.59	-2.98	-3.35	
45°	-2.21	-2.53	-2.42	-2.33	-2.62	-2.97	-3.07	-3.18	-3.15	-3.50	-4.03	
50°	-2.54	-2.95	-2.97	-2.91	-3.10	-3.42	-3.62	-3.89	-3.94	-4.15	-4.79	
55°	-2.86	-3.33	-3.46	-3.50	-3.66	-3.99	-4.24	-4.62	-4.88	-5.07	-5.70	
60°	-3.27	-3.72	-3.93	-4.12	-4.31	-4.65	-4.96	-5.38	-5.83	-6.11	-6.66	
65°	-3.73	-4.19	-4.45	-4.73	-4.98	-5.34	-5.69	-6.12	-6.69	-7.05	-7.65	
70°	-4.19	-4.66	-4.96	-5.33	-5.62	-5.97	-6.37	-6.87	-7.45	-7.95	-8.87	
75°	-4.57	-5.10	-5.43	-5.86	-6.28	-6.57	-7.02	-7.63	-8.29	-8.91	-9.90	
80°	-4.91	-5.48	-5.89	-6.34	-6.89	-7.30	-7.76	-8.43	-9.08	-9.81	-10.72	
85°	-5.26	-5.84	-6.35	-6.86	-7.49	-8.08	-8.64	-9.30	-9.78	-10.46	-11.50	
90°	-5.61	-6.20	-6.77	-7.39	-8.03	-8.69	-9.35	-10.00	-10.45	-11.03	-12.41	
95°	-5.94	-6.62	-7.23	-7.94	-8.47	-9.14	-9.69	-10.40	-11.05	-11.98	-13.88	
100°	-6.26	-6.97	-7.66	-8.51	-8.96	-9.44	-9.96	-10.71	-11.72	-13.05	-14.80	
105°	-6.57	-7.28	-7.98	-8.84	-9.47	-9.94	-10.35	-11.17	-12.31	-13.75	-14.87	
110°	-6.87	-7.54	-8.17	-9.03	-9.86	-10.35	-10.96	-11.95	-12.85	-13.94	-14.98	
115°	-7.04	-7.68	-8.30	-9.15	-10.18	-10.73	-11.41	-12.41	-13.38	-14.55	-15.45	
120°	-7.10	-7.73	-8.41	-9.36	-10.36	-10.85	-11.64	-12.57	-13.95	-14.91	-16.17	
125°	-7.18	-7.83	-8.55	-9.48	-10.34	-10.79	-11.51	-12.61	-14.16	-15.13	-16.52	
130°	-7.36	-7.99	-8.81	-9.85	-10.36	-10.62	-11.43	-12.70	-13.88	-14.96	-16.28	
135°	-7.63	-8.44	-9.46	-10.45	-10.49	-10.73	-11.57	-13.26	-13.30	-14.41	-16.04	
140°	-7.75	-8.74	-9.86	-10.69	-10.87	-11.53	-12.73	-14.30	-13.62	-14.34	-16.63	
145°	-7.55	-8.59	-9.56	-10.21	-10.76	-11.72	-13.28	-14.47	-14.19	-15.50	-18.80	
150°	-7.38	-8.35	-9.02	-9.49	-10.21	-11.43	-12.93	-13.54	-14.00	-15.76	-18.80	
155°	-7.34	-8.32	-8.88	-9.19	-9.84	-11.25	-12.36	-12.53	-13.18	-15.49	-17.19	
160°	-7.17	-8.07	-8.56	-8.92	-9.83	-11.29	-12.34	-12.32	-13.15	-15.69	-16.36	
165°	-6.63	-7.43	-7.82	-8.23	-9.23	-10.78	-11.55	-11.64	-12.75	-15.43	-15.88	
170°	-5.99	-6.71	-6.95	-7.31	-8.32	-9.77	-10.38	-10.40	-11.57	-14.11	-14.42	
175°	-5.67	-6.32	-6.55	-6.85	-7.82	-9.09	-9.68	-9.64	-10.66	-13.09	-13.24	
180°	-5.62	-6.24	-6.48	-6.78	-7.73	-8.99	-9.55	-9.54	-10.52	-12.95	-13.03	
185°	-5.83	-6.50	-6.76	-7.09	-8.07	-9.39	-10.07	-10.06	-11.05	-13.62	-13.86	
190°	-6.26	-7.02	-7.28	-7.65	-8.70	-10.23	-10.95	-10.99	-12.20	-14.94	-15.39	
195°	-6.88	-7.73	-8.15	-8.59	-9.62	-11.27	-12.22	-12.32	-13.41	-16.38	-17.07	
200°	-7.36	-8.29	-8.84	-9.21	-10.13	-11.76	-13.03	-13.04	-13.87	-16.79	-17.81	
205°	-7.52	-8.60	-9.27	-9.59	-10.28	-11.82	-13.19	-13.30	-13.78	-16.29	-18.15	
210°	-7.61	-8.65	-9.40	-9.81	-10.46	-11.73	-13.48	-14.14	-14.42	-16.35	-19.84	
215°	-7.67	-8.80	-9.90	-10.61	-11.12	-12.15	-13.90	-15.31	-14.76	-15.95	-19.62	
220°	-7.93	-8.98	-10.22	-11.11	-11.28	-11.83	-13.21	-15.19	-14.38	-15.05	-18.07	
225°	-7.76	-8.67	-9.82	-10.89	-11.03	-11.14	-12.23	-14.06	-13.93	-15.15	-16.97	
230°	-7.53	-8.29	-9.20	-10.24	-10.74	-11.05	-12.00	-13.31	-14.36	-15.64	-17.33	
235°	-7.35	-8.07	-8.88	-9.84	-10.69	-11.20	-12.10	-13.21	-14.54	-15.51	-17.88	
240°	-7.29	-7.97	-8.71	-9.72	-10.67	-11.19	-12.22	-13.26	-14.28	-15.10	-17.26	
245°	-7.22	-7.92	-8.61	-9.49	-10.42	-10.96	-11.91	-13.13	-13.77	-14.78	-16.22	
250°	-6.98	-7.73	-8.45	-9.35	-10.10	-10.58	-11.38	-12.72	-13.42	-14.19	-15.59	
255°	-6.67	-7.45	-8.25	-9.19	-9.77	-10.18	-10.73	-11.83	-12.91	-14.19	-15.64	
260°	-6.38	-7.15	-7.95	-8.88	-9.28	-9.69	-10.33	-11.23	-12.19	-13.43	-15.70	
265°	-6.04	-6.78	-7.49	-8.29	-8.78	-9.40	-10.07	-10.91	-11.52	-12.34	-14.69	
270°	-5.70	-6.33	-6.99	-7.66	-8.27	-8.90	-9.72	-10.56	-10.92	-11.40	-13.08	
275°	-5.35	-5.98	-6.56	-7.13	-7.71	-8.26	-9.00	-9.82	-10.29	-10.89	-12.21	
280°	-4.99	-5.62	-6.10	-6.62	-7.14	-7.55	-8.15	-8.97	-9.63	-10.32	-11.44	
285°	-4.67	-5.25	-5.67	-6.14	-6.51	-6.83	-7.36	-8.08	-8.73	-9.35	-10.61	
290°	-4.29	-4.81	-5.20	-5.59	-5.86	-6.24	-6.74	-7.33	-7.89	-8.47	-9.55	
295°	-3.82	-4.33	-4.66	-4.95	-5.18	-5.59	-6.05	-6.55	-7.12	-7.55	-8.30	
300°	-3.35	-3.85	-4.10	-4.29	-4.46	-4.87	-5.27	-5.74	-6.22	-6.57	-7.17	
305°	-2.98	-3.48	-3.63	-3.67	-3.84	-4.24	-4.58	-5.01	-5.30	-5.53	-6.21	
310°	-2.62	-3.06	-3.09	-3.03	-3.25	-3.63	-3.90	-4.21	-4.26	-4.53	-5.21	
315°	-2.29	-2.62	-2.52	-2.45	-2.78	-3.18	-3.33	-3.46	-3.43	-3.83	-4.42	
320°	-1.97	-2.20	-1.98	-1.93	-2.33	-2.72	-2.79	-2.75	-2.85	-3.32	-3.73	
325°	-1.63	-1.72	-1.50	-1.53	-1.96	-2.22	-2.21	-2.08	-2.40	-2.78	-3.03	
330°	-1.32	-1.31	-1.08	-1.16	-1.58	-1.78	-1.60	-1.58	-1.96	-2.16	-2.35	
335°	-0.96	-0.90	-0.72	-0.86	-1.21	-1.25	-1.09	-1.10	-1.46	-1.55	-1.71	
340°	-0.62	-0.57	-0.44	-0.57	-0.80	-0.81	-0.61	-0.74	-0.97	-0.96	-1.13	
345°	-0.37	-0.33	-0.24	-0.33	-0.49	-0.45	-0.33	-0.43	-0.56	-0.54	-0.67	
350°	-0.18	-0.16	-0.12	-0.17	-0.25	-0.20	-0.17	-0.21	-0.25	-0.26	-0.31	
355°	-0.03	-0.03	-0.01	-0.03	-0.06	-0.04	-0.03	-0.05	-0.06	-0.06	-0.07	

**Microphone Type 4966 for Hand-held Analyzer Types 2250, 2250-L and 2270 –  
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**Table A.34** Sensitivity variations for Windscreen UA-1650, Microphone Type 4966 and Microphone Preamplifier ZC-0032, with the microphone preamplifier connected to a microphone extension cable, at sound incidence angles within  $\pm\theta^\circ$  from the reference direction

Nominal Frequency	Exact Frequency	Max Variation $\pm 30^\circ$ dB	Max Variation $\pm 90^\circ$ dB	Max Variation $\pm 150^\circ$ dB
<b>500 Hz</b>	0.501 Hz	0.02	0.09	0.10
<b>630 Hz</b>	0.631 Hz	0.03	0.11	0.12
<b>800 Hz</b>	0.794 Hz	0.02	0.13	0.16
<b>1000 Hz</b>	1000 Hz	0.04	0.18	0.21
<b>1250 Hz</b>	1.259 Hz	0.05	0.29	0.37
<b>1600 Hz</b>	1.585 Hz	0.07	0.41	0.58
<b>2000 Hz</b>	1.995 Hz	0.09	0.59	0.82
2240 Hz	2.239 Hz	0.10	0.66	0.93
<b>2500 Hz</b>	2.512 Hz	0.10	0.74	1.04
2800 Hz	2.818 Hz	0.11	0.77	1.11
<b>3150 Hz</b>	3.162 Hz	0.10	0.80	1.15
3550 Hz	3.548 Hz	0.13	0.84	1.22
<b>4000 Hz</b>	3.981 Hz	0.20	1.02	1.47
4500 Hz	4.467 Hz	0.29	1.43	2.00
<b>5000 Hz</b>	5.012 Hz	0.42	2.05	2.79
5600 Hz	5.623 Hz	0.40	2.50	3.42
<b>6300 Hz</b>	6.310 Hz	0.30	2.54	3.52
7100 Hz	7.079 Hz	0.32	2.62	3.49
<b>8000 Hz</b>	7.943 Hz	0.86	3.52	4.63
8500 Hz	8.414 Hz	0.96	4.03	5.55
9000 Hz	8.913 Hz	0.82	4.52	6.33
9500 Hz	9.441 Hz	0.63	4.72	6.75
<b>10000 Hz</b>	10000 Hz	0.67	4.91	6.96
10600 Hz	10.593 Hz	0.91	5.08	7.14
11200 Hz	11.220 Hz	1.33	5.71	7.94
11800 Hz	11.885 Hz	1.32	6.34	8.99
<b>12500 Hz</b>	12.589 Hz	1.09	7.00	10.23
13200 Hz	13.335 Hz	1.17	7.68	11.12
14000 Hz	14.125 Hz	1.59	8.28	11.29
15000 Hz	14.962 Hz	1.79	8.91	12.16
<b>16000 Hz</b>	15.849 Hz	1.61	9.73	13.91
17000 Hz	16.788 Hz	1.60	10.58	15.33
18000 Hz	17.783 Hz	1.97	10.93	14.77
19000 Hz	18.836 Hz	2.18	11.41	16.36
<b>20000 Hz</b>	19.953 Hz	2.37	13.11	19.87

**Table A.35** Directional response for Windscreen UA-1650, Microphone Type 4966, Microphone Preamplifier ZC-0032 and the analyzer with the microphone preamplifier mounted directly on the analyzer, measured in a plane parallel to the display and along the microphone's axis, 500 Hz – 3550 Hz

Frequency												
Angle	500 Hz	630 Hz	800 Hz	1000 Hz	1250 Hz	1600 Hz	2000 Hz	2240 Hz	2500 Hz	2800 Hz	3150 Hz	3550 Hz
0°	0.01	0.02	-0.01	-0.01	0.00	0.00	0.00	0.00	-0.02	-0.02	-0.01	-0.01
5°	0.00	0.02	0.00	0.01	0.00	-0.01	-0.02	0.00	-0.04	-0.02	-0.02	-0.02
10°	-0.01	0.00	-0.02	-0.01	-0.01	-0.01	-0.05	0.02	-0.08	0.00	-0.07	-0.05
15°	-0.01	-0.01	-0.02	0.00	-0.02	-0.03	-0.10	0.04	-0.13	0.04	-0.13	-0.05
20°	-0.01	0.01	-0.01	0.00	-0.02	-0.04	-0.16	0.07	-0.19	0.09	-0.21	0.00
25°	-0.01	0.02	-0.01	-0.01	-0.03	-0.09	-0.25	0.06	-0.24	0.09	-0.32	0.06
30°	-0.02	0.01	-0.01	-0.02	-0.02	-0.14	-0.32	0.04	-0.26	0.05	-0.39	0.13
35°	-0.01	0.03	0.00	-0.03	0.00	-0.24	-0.37	-0.06	-0.22	-0.06	-0.38	0.14
40°	-0.01	0.05	0.02	-0.04	0.02	-0.36	-0.37	-0.22	-0.15	-0.22	-0.33	0.03
45°	-0.03	0.07	0.05	-0.06	0.05	-0.51	-0.34	-0.41	-0.11	-0.38	-0.30	-0.14
50°	-0.03	0.10	0.09	-0.09	0.08	-0.63	-0.28	-0.56	-0.17	-0.44	-0.37	-0.23
55°	-0.08	0.11	0.13	-0.11	0.09	-0.71	-0.27	-0.58	-0.37	-0.37	-0.53	-0.18
60°	-0.09	0.10	0.18	-0.12	0.10	-0.71	-0.34	-0.48	-0.62	-0.32	-0.66	-0.18
65°	-0.11	0.09	0.22	-0.11	0.08	-0.63	-0.51	-0.38	-0.75	-0.43	-0.64	-0.32
70°	-0.15	0.08	0.26	-0.07	0.05	-0.51	-0.73	-0.42	-0.66	-0.71	-0.59	-0.46
75°	-0.18	0.04	0.27	0.00	0.02	-0.39	-0.87	-0.63	-0.50	-0.88	-0.73	-0.44
80°	-0.20	-0.01	0.28	0.08	0.00	-0.35	-0.84	-0.92	-0.56	-0.81	-1.04	-0.45
85°	-0.25	-0.04	0.25	0.15	0.02	-0.39	-0.67	-1.06	-0.89	-0.72	-1.16	-0.71
90°	-0.26	-0.08	0.21	0.21	0.08	-0.47	-0.48	-0.91	-1.20	-0.91	-1.04	-0.99
95°	-0.31	-0.15	0.14	0.23	0.17	-0.53	-0.40	-0.63	-1.14	-1.29	-1.12	-0.94
100°	-0.32	-0.18	0.06	0.21	0.29	-0.49	-0.44	-0.43	-0.73	-1.33	-1.47	-0.89
105°	-0.36	-0.25	-0.04	0.14	0.35	-0.40	-0.57	-0.48	-0.44	-0.92	-1.57	-1.21
110°	-0.38	-0.29	-0.11	0.03	0.33	-0.31	-0.66	-0.71	-0.50	-0.56	-1.15	-1.35
115°	-0.38	-0.34	-0.18	-0.11	0.25	-0.23	-0.57	-0.80	-0.73	-0.58	-0.71	-0.82
120°	-0.39	-0.37	-0.23	-0.25	0.11	-0.25	-0.40	-0.69	-0.85	-0.85	-0.73	-0.34
125°	-0.37	-0.36	-0.26	-0.38	-0.08	-0.37	-0.29	-0.45	-0.70	-0.95	-1.04	-0.45
130°	-0.37	-0.38	-0.26	-0.46	-0.26	-0.55	-0.33	-0.32	-0.45	-0.70	-1.10	-0.81
135°	-0.36	-0.37	-0.24	-0.50	-0.42	-0.82	-0.60	-0.48	-0.44	-0.50	-0.85	-0.78
140°	-0.32	-0.34	-0.21	-0.48	-0.52	-1.04	-0.97	-0.88	-0.74	-0.64	-0.75	-0.52
145°	-0.31	-0.31	-0.16	-0.42	-0.52	-1.10	-1.24	-1.25	-1.15	-1.05	-1.02	-0.55
150°	-0.25	-0.28	-0.11	-0.34	-0.43	-1.02	-1.31	-1.44	-1.46	-1.51	-1.56	-1.06
155°	-0.26	-0.26	-0.05	-0.23	-0.32	-0.88	-1.21	-1.40	-1.53	-1.72	-1.96	-1.63
160°	-0.22	-0.22	0.00	-0.14	-0.21	-0.73	-1.03	-1.20	-1.37	-1.58	-1.94	-1.82
165°	-0.21	-0.19	0.04	-0.06	-0.11	-0.57	-0.81	-0.92	-1.06	-1.22	-1.56	-1.47
170°	-0.21	-0.19	0.07	0.01	-0.02	-0.43	-0.60	-0.66	-0.75	-0.84	-1.10	-0.94
175°	-0.20	-0.18	0.09	0.05	0.04	-0.35	-0.48	-0.49	-0.55	-0.58	-0.78	-0.54
180°	-0.19	-0.19	0.10	0.06	0.06	-0.33	-0.44	-0.44	-0.47	-0.50	-0.68	-0.39
185°	-0.17	-0.16	0.09	0.04	0.03	-0.35	-0.49	-0.49	-0.55	-0.59	-0.79	-0.54
190°	-0.19	-0.19	0.08	0.02	-0.02	-0.44	-0.62	-0.66	-0.75	-0.84	-1.11	-0.94
195°	-0.21	-0.21	0.05	-0.04	-0.10	-0.56	-0.82	-0.90	-1.06	-1.22	-1.57	-1.48
200°	-0.23	-0.24	0.01	-0.12	-0.20	-0.70	-1.01	-1.15	-1.35	-1.57	-1.96	-1.86
205°	-0.27	-0.27	-0.04	-0.21	-0.33	-0.87	-1.22	-1.39	-1.58	-1.78	-2.04	-1.74
210°	-0.27	-0.29	-0.09	-0.32	-0.45	-1.02	-1.33	-1.45	-1.54	-1.59	-1.64	-1.13
215°	-0.32	-0.35	-0.14	-0.40	-0.52	-1.06	-1.22	-1.25	-1.20	-1.10	-1.05	-0.58
220°	-0.34	-0.37	-0.19	-0.47	-0.55	-1.03	-1.00	-0.93	-0.79	-0.67	-0.74	-0.51
225°	-0.36	-0.39	-0.22	-0.49	-0.44	-0.77	-0.56	-0.48	-0.38	-0.43	-0.78	-0.77
230°	-0.38	-0.39	-0.24	-0.46	-0.28	-0.54	-0.31	-0.32	-0.39	-0.63	-1.08	-0.87
235°	-0.38	-0.40	-0.23	-0.39	-0.10	-0.36	-0.28	-0.44	-0.64	-0.92	-1.10	-0.53
240°	-0.39	-0.38	-0.21	-0.27	0.10	-0.25	-0.39	-0.66	-0.85	-0.90	-0.82	-0.36
245°	-0.40	-0.33	-0.16	-0.13	0.25	-0.24	-0.56	-0.80	-0.80	-0.65	-0.74	-0.79
250°	-0.37	-0.29	-0.10	0.01	0.37	-0.28	-0.62	-0.69	-0.54	-0.56	-1.10	-1.32
255°	-0.33	-0.26	-0.02	0.13	0.41	-0.37	-0.53	-0.49	-0.44	-0.86	-1.54	-1.23
260°	-0.30	-0.19	0.06	0.21	0.33	-0.50	-0.45	-0.47	-0.70	-1.31	-1.52	-0.91
265°	-0.29	-0.15	0.14	0.25	0.22	-0.53	-0.40	-0.63	-1.08	-1.32	-1.16	-0.94
270°	-0.23	-0.09	0.20	0.24	0.12	-0.46	-0.46	-0.87	-1.18	-0.95	-1.03	-1.01
275°	-0.23	-0.05	0.26	0.19	0.04	-0.39	-0.67	-1.05	-0.94	-0.74	-1.16	-0.72
280°	-0.17	-0.01	0.28	0.11	0.03	-0.31	-0.80	-0.90	-0.58	-0.76	-1.05	-0.39
285°	-0.15	0.02	0.28	0.04	0.02	-0.36	-0.85	-0.67	-0.50	-0.85	-0.76	-0.38
290°	-0.14	0.03	0.27	-0.02	0.05	-0.45	-0.71	-0.46	-0.61	-0.70	-0.54	-0.42
295°	-0.09	0.08	0.24	-0.06	0.09	-0.56	-0.49	-0.40	-0.67	-0.43	-0.56	-0.28
300°	-0.07	0.08	0.20	-0.09	0.10	-0.66	-0.33	-0.48	-0.56	-0.29	-0.60	-0.13
305°	-0.05	0.08	0.16	-0.09	0.10	-0.67	-0.27	-0.54	-0.33	-0.31	-0.50	-0.14
310°	-0.05	0.08	0.12	-0.07	0.08	-0.59	-0.28	-0.51	-0.15	-0.34	-0.34	-0.21
315°	-0.03	0.06	0.08	-0.05	0.06	-0.48	-0.33	-0.37	-0.08	-0.31	-0.26	-0.16
320°	0.00	0.05	0.05	-0.04	0.04	-0.33	-0.36	-0.18	-0.10	-0.17	-0.26	0.03
325°	-0.02	0.02	0.02	-0.02	0.01	-0.21	-0.36	-0.03	-0.16	-0.02	-0.33	0.17
330°	-0.01	0.02	0.01	-0.01	0.00	-0.12	-0.31	0.06	-0.19	0.09	-0.36	0.19
335°	0.00	-0.01	0.01	-0.01	-0.01	-0.06	-0.23	0.09	-0.18	0.13	-0.31	0.13
340°	0.00	0.01	0.00	-0.01	-0.01	-0.02	-0.15	0.09	-0.13	0.13	-0.22	0.06
345°	0.01	0.01	0.00	-0.01	-0.01	0.00	-0.08	0.07	-0.06	0.10	-0.12	0.01
350°	-0.01	-0.01	0.01	-0.01	-0.01	0.01	-0.03	0.04	-0.01	0.07	-0.06	0.00
355°	0.01	0.00	0.01	0.00	0.01	0.01	0.00	0.03	0.03	0.05	-0.01	0.01

**Microphone Type 4966 for Hand-held Analyzer Types 2250, 2250-L and 2270 –  
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**Table A.36** Directional response for Windscreen UA-1650, Microphone Type 4966, Microphone Preamplifier ZC-0032 and the analyzer with the microphone preamplifier mounted directly on the analyzer, measured in a plane parallel to the display and along the microphone's axis, 4000 Hz – 10600 Hz

Frequency													
Angle	4000 Hz	4500 Hz	5000 Hz	5600 Hz	6300 Hz	7100 Hz	8000 Hz	8500 Hz	9000 Hz	9500 Hz	10000 Hz	10600 Hz	
0°	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	0.00	0.00	-0.01	-0.01	
5°	0.00	0.00	0.00	-0.04	-0.06	-0.04	-0.07	-0.06	-0.06	-0.07	-0.05	-0.07	
10°	0.03	0.02	0.00	-0.08	-0.15	-0.07	-0.18	-0.20	-0.16	-0.18	-0.17	-0.23	
15°	0.10	0.07	0.01	-0.12	-0.27	-0.04	-0.35	-0.37	-0.27	-0.31	-0.29	-0.42	
20°	0.19	0.08	-0.02	-0.16	-0.42	-0.01	-0.50	-0.52	-0.33	-0.40	-0.40	-0.49	
25°	0.20	-0.03	-0.14	-0.24	-0.56	-0.10	-0.60	-0.68	-0.43	-0.58	-0.51	-0.52	
30°	0.12	-0.24	-0.32	-0.34	-0.52	-0.22	-0.75	-0.96	-0.74	-0.92	-0.70	-0.66	
35°	-0.05	-0.42	-0.43	-0.53	-0.47	-0.10	-1.10	-1.26	-1.11	-1.13	-1.02	-0.91	
40°	-0.20	-0.48	-0.40	-0.82	-0.76	-0.11	-1.32	-1.42	-1.44	-1.33	-1.44	-1.11	
45°	-0.25	-0.47	-0.35	-0.98	-1.09	-0.65	-1.47	-1.84	-1.78	-1.77	-1.79	-1.54	
50°	-0.23	-0.57	-0.50	-1.09	-1.19	-0.72	-1.63	-2.08	-2.02	-2.26	-2.02	-2.02	
55°	-0.34	-0.72	-0.69	-1.31	-1.52	-0.84	-1.45	-2.41	-2.34	-2.57	-2.54	-2.13	
60°	-0.51	-0.82	-0.78	-1.36	-1.73	-1.34	-1.88	-2.34	-2.76	-2.80	-3.19	-2.50	
65°	-0.53	-0.89	-0.94	-1.46	-1.85	-1.47	-2.01	-2.65	-2.91	-3.23	-3.38	-3.17	
70°	-0.50	-0.98	-1.19	-1.68	-2.02	-1.95	-2.50	-2.98	-3.12	-3.49	-3.68	-3.46	
75°	-0.61	-1.02	-1.32	-1.74	-1.98	-2.02	-2.60	-3.44	-3.60	-3.58	-4.15	-3.73	
80°	-0.75	-1.12	-1.22	-2.16	-2.14	-2.11	-2.96	-3.58	-4.24	-4.15	-4.16	-4.42	
85°	-0.78	-1.22	-1.27	-2.36	-2.36	-2.22	-3.16	-3.77	-4.34	-4.98	-4.70	-4.59	
90°	-0.99	-1.39	-1.41	-2.23	-2.97	-2.25	-3.43	-3.80	-4.42	-4.99	-5.55	-4.98	
95°	-1.37	-1.63	-1.51	-2.24	-2.64	-2.60	-3.59	-4.14	-4.42	-5.05	-5.52	-5.43	
100°	-1.41	-1.97	-2.02	-2.28	-2.84	-2.62	-3.82	-4.45	-4.82	-5.16	-5.47	-5.51	
105°	-1.31	-2.18	-2.38	-2.83	-2.63	-2.63	-3.86	-4.49	-5.21	-5.50	-5.70	-5.80	
110°	-1.55	-2.04	-2.59	-3.48	-3.51	-2.48	-3.83	-4.18	-5.01	-5.59	-6.28	-6.00	
115°	-1.56	-2.17	-2.55	-3.61	-3.95	-3.20	-3.92	-4.79	-5.03	-5.38	-5.92	-5.72	
120°	-0.96	-2.05	-2.45	-3.50	-4.19	-3.77	-5.11	-5.21	-5.66	-6.13	-6.11	-5.63	
125°	-0.55	-1.31	-2.11	-3.12	-3.86	-3.99	-5.27	-6.16	-7.12	-7.23	-7.19	-6.77	
130°	-0.80	-1.08	-1.43	-2.74	-3.18	-3.21	-5.34	-6.32	-6.95	-7.57	-8.24	-7.99	
135°	-1.15	-1.58	-1.37	-2.24	-2.80	-2.41	-3.88	-4.91	-6.34	-7.31	-7.81	-7.52	
140°	-0.99	-1.79	-1.96	-2.42	-2.53	-2.13	-3.43	-4.22	-4.80	-5.32	-5.97	-6.16	
145°	-0.76	-1.44	-1.96	-2.90	-3.21	-2.44	-3.44	-4.08	-4.80	-5.17	-5.53	-5.25	
150°	-1.07	-1.48	-1.70	-2.73	-3.46	-3.12	-4.27	-4.82	-5.19	-5.22	-5.40	-5.34	
155°	-1.73	-2.13	-2.09	-2.75	-3.21	-2.99	-4.33	-5.13	-5.92	-6.32	-6.58	-6.22	
160°	-2.14	-2.76	-2.87	-3.52	-3.70	-3.30	-4.24	-4.70	-5.32	-5.74	-6.21	-6.52	
165°	-1.90	-2.61	-2.97	-4.00	-4.32	-4.16	-5.28	-5.71	-6.02	-6.13	-6.36	-6.22	
170°	-1.31	-1.93	-2.24	-3.39	-3.83	-3.79	-5.26	-5.98	-6.50	-6.90	-7.48	-7.47	
175°	-0.84	-1.34	-1.52	-2.51	-2.91	-2.70	-3.95	-4.58	-5.08	-5.55	-6.19	-6.43	
180°	-0.67	-1.15	-1.25	-2.13	-2.54	-2.25	-3.34	-3.88	-4.31	-4.69	-5.22	-5.40	
185°	-0.84	-1.35	-1.49	-2.40	-3.00	-2.79	-3.99	-4.63	-5.14	-5.62	-6.28	-6.51	
190°	-1.31	-1.93	-2.19	-3.23	-4.09	-3.97	-5.39	-6.18	-6.76	-7.22	-7.93	-7.92	
195°	-1.91	-2.62	-2.92	-4.03	-4.80	-4.34	-5.51	-6.02	-6.47	-6.60	-6.77	-6.62	
200°	-2.21	-2.82	-2.95	-3.86	-4.10	-3.44	-4.51	-4.96	-5.59	-5.91	-6.34	-6.73	
205°	-1.87	-2.25	-2.25	-3.11	-3.38	-3.08	-4.51	-5.29	-6.06	-6.49	-6.77	-6.50	
210°	-1.18	-1.55	-1.77	-2.96	-3.53	-3.28	-4.46	-5.05	-5.43	-5.48	-5.66	-5.70	
215°	-0.84	-1.49	-2.02	-3.23	-3.30	-2.59	-3.60	-4.13	-5.02	-5.41	-5.66	-5.33	
220°	-1.00	-1.82	-2.04	-2.72	-2.57	-2.27	-3.51	-4.37	-4.92	-5.37	-5.92	-6.13	
225°	-1.18	-1.68	-1.57	-2.36	-2.90	-2.39	-3.85	-4.87	-6.42	-7.33	-7.96	-7.66	
230°	-0.87	-1.17	-1.53	-2.65	-3.20	-3.19	-5.41	-6.51	-7.11	-7.74	-8.52	-8.40	
235°	-0.59	-1.38	-2.11	-3.08	-3.95	-4.16	-5.30	-6.29	-7.41	-7.50	-7.53	-6.88	
240°	-0.94	-2.06	-2.42	-3.53	-4.50	-3.87	-5.25	-5.49	-5.90	-6.30	-6.26	-5.85	
245°	-1.55	-2.16	-2.55	-3.79	-4.02	-3.27	-3.93	-4.85	-5.16	-5.49	-6.23	-5.91	
250°	-1.59	-2.11	-2.68	-3.70	-3.57	-2.59	-3.86	-4.33	-5.04	-5.72	-6.35	-5.93	
255°	-1.37	-2.24	-2.49	-3.06	-2.67	-2.63	-3.91	-4.52	-5.29	-5.48	-5.68	-5.86	
260°	-1.45	-2.03	-2.08	-2.31	-3.04	-2.62	-3.77	-4.45	-4.84	-5.20	-5.59	-5.59	
265°	-1.38	-1.67	-1.55	-2.22	-2.74	-2.58	-3.55	-4.20	-4.53	-5.06	-5.65	-5.34	
270°	-0.99	-1.38	-1.41	-2.34	-2.90	-2.14	-3.36	-3.88	-4.51	-4.99	-5.61	-4.94	
275°	-0.77	-1.19	-1.32	-2.43	-2.21	-2.15	-3.16	-3.78	-4.29	-5.02	-4.85	-4.58	
280°	-0.74	-1.12	-1.35	-2.24	-2.22	-2.04	-2.97	-3.59	-4.35	-4.27	-4.19	-4.36	
285°	-0.61	-1.04	-1.35	-1.69	-2.08	-2.03	-2.50	-3.54	-3.75	-3.55	-4.15	-3.72	
290°	-0.49	-1.01	-1.16	-1.66	-1.96	-1.83	-2.49	-3.13	-3.10	-3.42	-3.78	-3.38	
295°	-0.53	-0.89	-0.91	-1.57	-1.86	-1.35	-2.14	-2.66	-2.87	-3.31	-3.38	-3.09	
300°	-0.53	-0.77	-0.75	-1.41	-1.64	-1.28	-1.83	-2.31	-2.83	-2.81	-3.16	-2.55	
305°	-0.35	-0.67	-0.72	-1.31	-1.50	-0.85	-1.42	-2.43	-2.48	-2.50	-2.66	-2.14	
310°	-0.20	-0.48	-0.55	-1.07	-1.05	-0.71	-1.52	-2.20	-2.01	-2.21	-2.09	-1.83	
315°	-0.20	-0.41	-0.40	-1.02	-1.05	-0.59	-1.52	-1.92	-1.70	-1.85	-1.79	-1.50	
320°	-0.14	-0.45	-0.40	-0.91	-0.88	0.01	-1.37	-1.39	-1.39	-1.40	-1.31	-1.06	
325°	0.00	-0.42	-0.39	-0.60	-0.59	0.02	-1.15	-1.19	-1.16	-1.12	-1.01	-0.97	
330°	0.17	-0.26	-0.28	-0.30	-0.53	-0.08	-0.74	-0.88	-0.82	-0.84	-0.73	-0.64	
335°	0.25	-0.06	-0.11	-0.10	-0.49	0.00	-0.55	-0.64	-0.48	-0.50	-0.55	-0.47	
340°	0.24	0.05	-0.01	-0.01	-0.29	0.04	-0.41	-0.54	-0.34	-0.34	-0.46	-0.43	
345°	0.18	0.07	0.04	0.02	-0.11	0.00	-0.22	-0.38	-0.24	-0.23	-0.32	-0.33	
350°	0.12	0.03	0.04	0.02	0.01	-0.04	-0.07	-0.21	-0.11	-0.10	-0.18	-0.16	
355°	0.08	0.00	0.05	0.02	0.05	-0.01	0.05	-0.07	0.00	0.01	-0.05	0.01	

**Table A.37** Directional response for Windscreen UA-1650, Microphone Type 4966, Microphone Preamplifier ZC-0032 and the analyzer with the microphone preamplifier mounted directly on the analyzer, measured in a plane parallel to the display and along the microphone's axis, 11 200 Hz – 20000 Hz

Frequency											
Angle	11200 Hz	11800 Hz	12500 Hz	13200 Hz	14000 Hz	15000 Hz	16000 Hz	17000 Hz	18000 Hz	19000 Hz	20000 Hz
0°	0.00	-0.01	-0.01	0.00	-0.01	-0.02	-0.02	-0.04	-0.02	-0.01	0.00
5°	-0.07	-0.09	-0.08	-0.06	-0.10	-0.06	-0.09	-0.12	-0.09	-0.10	-0.12
10°	-0.21	-0.22	-0.19	-0.17	-0.23	-0.20	-0.20	-0.25	-0.23	-0.32	-0.35
15°	-0.41	-0.43	-0.25	-0.38	-0.31	-0.54	-0.38	-0.35	-0.43	-0.49	-0.60
20°	-0.66	-0.76	-0.28	-0.61	-0.47	-1.13	-0.58	-0.54	-0.69	-0.91	-0.88
25°	-0.95	-1.23	-0.56	-0.86	-0.94	-1.45	-1.09	-0.97	-1.14	-1.62	-1.55
30°	-1.25	-1.58	-0.88	-1.32	-1.16	-1.79	-1.73	-1.40	-1.57	-2.22	-2.22
35°	-1.68	-2.05	-1.43	-1.60	-1.62	-1.96	-2.60	-2.02	-1.87	-2.62	-2.81
40°	-1.86	-2.32	-2.13	-1.97	-2.05	-2.54	-2.95	-2.80	-2.36	-3.12	-3.53
45°	-2.16	-2.81	-2.73	-2.44	-2.62	-3.04	-3.25	-3.60	-3.17	-3.77	-4.18
50°	-2.48	-3.11	-2.92	-3.27	-3.12	-3.37	-3.93	-4.06	-4.05	-4.38	-4.74
55°	-3.00	-3.40	-3.46	-3.82	-3.67	-4.12	-4.64	-4.54	-4.97	-5.65	-5.77
60°	-3.49	-4.00	-4.04	-4.27	-4.43	-4.87	-5.41	-5.74	-5.68	-6.34	-6.84
65°	-3.64	-4.73	-4.42	-5.15	-4.66	-5.77	-6.30	-6.24	-6.86	-7.14	-7.85
70°	-4.22	-4.93	-4.94	-5.78	-5.42	-6.17	-6.89	-7.49	-7.40	-8.10	-9.04
75°	-4.51	-5.48	-5.25	-6.17	-6.34	-6.74	-7.29	-8.16	-8.37	-9.29	-10.12
80°	-4.54	-5.87	-5.91	-6.54	-6.83	-7.74	-8.25	-8.66	-9.11	-10.38	-10.95
85°	-5.34	-5.74	-6.58	-7.01	-7.51	-8.12	-9.54	-9.55	-9.90	-10.68	-11.83
90°	-5.78	-6.38	-6.63	-7.71	-7.85	-9.08	-9.50	-10.67	-10.41	-11.40	-12.74
95°	-6.31	-7.13	-7.16	-8.09	-8.44	-9.29	-10.22	-10.46	-11.24	-12.20	-14.16
100°	-6.32	-7.66	-8.14	-8.82	-8.75	-9.80	-10.32	-11.21	-11.70	-13.19	-15.23
105°	-6.40	-7.53	-8.13	-9.66	-9.72	-10.10	-10.81	-11.73	-12.32	-14.04	-15.03
110°	-6.94	-7.99	-7.95	-9.15	-10.19	-10.87	-11.70	-12.30	-12.99	-14.14	-15.49
115°	-7.06	-8.04	-8.51	-9.56	-9.89	-10.77	-12.35	-13.01	-13.48	-14.90	-16.06
120°	-6.55	-7.06	-8.03	-9.64	-10.17	-11.17	-12.44	-12.94	-14.26	-15.09	-16.36
125°	-6.88	-7.44	-8.13	-8.77	-9.00	-10.42	-11.70	-13.03	-14.20	-16.02	-17.48
130°	-8.51	-9.37	-9.84	-10.05	-9.98	-10.40	-10.63	-11.77	-12.52	-14.26	-15.78
135°	-8.72	-10.12	-10.95	-12.19	-12.51	-13.14	-13.01	-13.95	-13.01	-13.44	-15.03
140°	-7.62	-9.22	-10.19	-11.54	-11.63	-12.81	-14.53	-16.98	-16.84	-17.08	-19.25
145°	-6.01	-7.31	-8.37	-9.54	-9.75	-10.99	-13.23	-14.60	-14.37	-15.85	-19.88
150°	-6.66	-7.85	-8.23	-8.53	-8.68	-10.15	-11.80	-12.35	-12.52	-14.41	-17.71
155°	-7.05	-8.05	-8.38	-9.05	-9.29	-11.36	-12.58	-12.18	-12.25	-14.63	-16.63
160°	-7.89	-9.06	-9.48	-9.85	-10.25	-11.70	-12.79	-12.34	-13.07	-16.12	-17.14
165°	-7.38	-8.16	-8.42	-9.06	-9.70	-11.82	-13.02	-13.05	-14.12	-16.95	-17.10
170°	-8.55	-9.36	-9.16	-9.67	-10.01	-11.58	-12.11	-11.59	-12.49	-15.31	-15.06
175°	-7.73	-8.89	-9.05	-9.72	-10.58	-12.40	-13.54	-13.40	-14.43	-17.55	-17.15
180°	-6.60	-7.65	-7.82	-8.35	-9.18	-10.94	-12.02	-12.03	-13.21	-16.38	-16.74
185°	-7.76	-9.02	-9.26	-10.01	-11.02	-12.88	-13.98	-13.56	-14.86	-18.29	-18.40
190°	-9.01	-10.06	-9.99	-10.54	-10.83	-12.40	-12.81	-12.21	-13.04	-16.48	-16.39
195°	-7.87	-8.73	-9.02	-9.60	-10.23	-12.26	-13.40	-13.35	-14.64	-18.40	-18.34
200°	-8.18	-9.48	-10.10	-10.36	-10.68	-12.10	-13.36	-12.92	-13.63	-17.43	-18.36
205°	-7.56	-8.59	-8.90	-9.46	-9.62	-11.77	-13.17	-12.37	-12.37	-15.47	-16.51
210°	-7.06	-8.29	-8.64	-8.72	-8.63	-9.97	-11.80	-12.40	-12.26	-14.69	-17.76
215°	-6.09	-7.29	-8.46	-9.63	-9.74	-11.09	-13.33	-14.94	-14.51	-16.40	-19.88
220°	-7.73	-9.27	-10.43	-11.83	-12.10	-12.99	-14.26	-17.08	-16.91	-17.64	-20.12
225°	-8.94	-10.47	-11.57	-12.44	-12.68	-13.28	-13.17	-14.31	-13.18	-14.31	-15.52
230°	-8.81	-9.70	-10.31	-10.16	-9.87	-10.70	-10.84	-11.77	-12.41	-14.63	-15.89
235°	-7.13	-7.53	-8.51	-9.12	-9.09	-10.35	-11.41	-12.63	-13.77	-16.17	-18.27
240°	-6.84	-7.30	-8.33	-9.75	-9.83	-10.98	-12.50	-12.90	-14.24	-15.63	-17.00
245°	-7.09	-8.14	-8.63	-9.57	-9.92	-10.79	-12.42	-12.96	-13.13	-15.12	-16.09
250°	-6.93	-8.12	-8.20	-9.32	-10.11	-10.63	-11.55	-12.24	-13.02	-14.56	-15.22
255°	-6.53	-7.51	-8.33	-9.76	-9.66	-10.00	-10.61	-11.38	-12.20	-14.36	-14.96
260°	-6.37	-7.67	-8.29	-9.04	-8.83	-9.58	-10.04	-10.87	-11.61	-13.68	-15.32
265°	-6.37	-7.22	-7.41	-8.23	-8.31	-9.17	-9.99	-10.12	-11.13	-12.55	-14.06
270°	-5.96	-6.36	-6.67	-7.76	-7.80	-8.89	-9.29	-10.42	-10.40	-11.78	-12.44
275°	-5.34	-5.69	-6.59	-7.23	-7.45	-8.00	-9.20	-9.33	-9.88	-10.93	-11.80
280°	-4.57	-5.78	-6.06	-6.73	-6.79	-7.47	-8.12	-8.38	-9.20	-10.82	-10.89
285°	-4.49	-5.48	-5.46	-6.30	-6.24	-6.63	-6.98	-8.05	-8.37	-9.50	-10.17
290°	-4.18	-5.07	-5.06	-5.87	-5.39	-5.87	-6.75	-7.34	-7.35	-8.50	-9.10
295°	-3.77	-4.74	-4.49	-5.32	-4.39	-5.72	-5.97	-6.19	-6.88	-7.40	-7.83
300°	-3.48	-4.01	-4.18	-4.24	-4.32	-4.64	-5.23	-5.45	-5.64	-6.60	-6.88
305°	-2.97	-3.47	-3.53	-3.78	-3.68	-3.93	-4.51	-4.51	-5.03	-5.88	-5.78
310°	-2.49	-3.14	-2.87	-3.34	-2.88	-3.29	-3.83	-3.87	-4.04	-4.58	-4.80
315°	-2.31	-2.79	-2.72	-2.45	-2.52	-2.84	-3.19	-3.50	-3.11	-3.88	-4.18
320°	-1.79	-2.24	-2.15	-1.89	-2.07	-2.42	-2.81	-2.79	-2.31	-3.32	-3.64
325°	-1.65	-2.06	-1.40	-1.59	-1.58	-1.94	-2.50	-2.03	-1.88	-2.74	-2.85
330°	-1.21	-1.60	-0.83	-1.41	-1.08	-1.71	-1.73	-1.36	-1.51	-2.31	-2.26
335°	-0.92	-1.21	-0.47	-0.86	-0.91	-1.37	-1.07	-0.90	-1.04	-1.68	-1.62
340°	-0.67	-0.77	-0.27	-0.58	-0.47	-1.09	-0.56	-0.58	-0.66	-0.95	-0.92
345°	-0.42	-0.36	-0.23	-0.33	-0.31	-0.51	-0.30	-0.39	-0.38	-0.49	-0.60
350°	-0.23	-0.11	-0.18	-0.13	-0.23	-0.16	-0.11	-0.20	-0.23	-0.31	-0.31
355°	-0.07	0.03	-0.05	-0.01	-0.05	-0.01	0.03	-0.07	-0.07	-0.07	-0.08

**Microphone Type 4966 for Hand-held Analyzer Types 2250, 2250-L and 2270 –  
Supplement to Instruction Manual BE 1712**

**Table A.38** Directional response for Windscreen UA-1650, Microphone Type 4966, Microphone Preamplifier ZC-0032 and the analyzer with the microphone preamplifier mounted directly on the analyzer, measured in a plane perpendicular to the display and along the microphone's axis, 500 Hz – 3550 Hz

Frequency		500 Hz	630 Hz	800 Hz	1000 Hz	1250 Hz	1600 Hz	2000 Hz	2240 Hz	2500 Hz	2800 Hz	3150 Hz	3550 Hz
Angle													
0°		0.02	0.00	-0.01	-0.01	0.00	-0.01	-0.01	-0.01	-0.01	-0.02	-0.01	-0.01
5°		0.00	-0.01	0.00	0.02	0.00	-0.01	-0.02	-0.01	-0.03	-0.01	-0.03	-0.02
10°		-0.02	0.00	-0.02	0.01	-0.01	-0.01	-0.04	0.01	-0.06	0.01	-0.06	-0.04
15°		-0.01	0.02	-0.02	0.01	-0.03	-0.02	-0.07	0.02	-0.10	0.04	-0.10	-0.04
20°		-0.02	0.02	-0.02	0.01	-0.03	-0.03	-0.12	0.05	-0.17	0.08	-0.18	-0.01
25°		-0.05	0.00	-0.03	0.01	-0.06	-0.07	-0.20	0.05	-0.26	0.09	-0.28	0.01
30°		-0.03	0.03	-0.03	0.01	-0.05	-0.10	-0.27	0.06	-0.30	0.08	-0.34	0.07
35°		-0.04	0.02	-0.04	0.00	-0.06	-0.19	-0.34	0.01	-0.29	-0.03	-0.34	0.06
40°		-0.06	0.09	-0.02	0.00	-0.04	-0.29	-0.38	-0.11	-0.24	-0.21	-0.27	-0.08
45°		-0.05	0.09	-0.01	-0.03	-0.01	-0.44	-0.38	-0.28	-0.17	-0.42	-0.21	-0.31
50°		-0.08	0.12	0.03	-0.06	0.03	-0.58	-0.33	-0.44	-0.20	-0.49	-0.28	-0.45
55°		-0.11	0.13	0.07	-0.10	0.05	-0.67	-0.30	-0.50	-0.36	-0.37	-0.55	-0.35
60°		-0.16	0.14	0.13	-0.11	0.06	-0.69	-0.35	-0.43	-0.59	-0.21	-0.82	-0.23
65°		-0.14	0.13	0.18	-0.10	0.03	-0.63	-0.49	-0.35	-0.71	-0.26	-0.78	-0.41
70°		-0.18	0.11	0.23	-0.06	-0.01	-0.52	-0.71	-0.37	-0.64	-0.56	-0.52	-0.79
75°		-0.21	0.07	0.25	0.03	-0.05	-0.42	-0.88	-0.55	-0.51	-0.76	-0.52	-0.75
80°		-0.25	0.05	0.27	0.12	-0.07	-0.39	-0.90	-0.84	-0.60	-0.63	-0.88	-0.44
85°		-0.29	-0.01	0.25	0.22	-0.03	-0.43	-0.79	-1.01	-0.96	-0.53	-1.01	-0.62
90°		-0.30	-0.06	0.21	0.29	0.07	-0.51	-0.66	-0.92	-1.27	-0.84	-0.81	-1.02
95°		-0.39	-0.11	0.15	0.32	0.20	-0.55	-0.63	-0.72	-1.23	-1.36	-0.94	-0.81
100°		-0.41	-0.19	0.07	0.30	0.37	-0.47	-0.67	-0.60	-0.91	-1.38	-1.55	-0.76
105°		-0.41	-0.25	-0.01	0.22	0.45	-0.31	-0.71	-0.70	-0.77	-0.95	-1.75	-1.47
110°		-0.45	-0.31	-0.10	0.10	0.45	-0.16	-0.65	-0.83	-0.92	-0.77	-1.24	-1.79
115°		-0.50	-0.34	-0.17	-0.04	0.36	-0.06	-0.42	-0.69	-1.04	-0.98	-0.94	-1.12
120°		-0.49	-0.38	-0.23	-0.20	0.19	-0.07	-0.18	-0.36	-0.82	-1.11	-1.18	-0.81
125°		-0.46	-0.40	-0.27	-0.34	-0.03	-0.20	-0.08	-0.05	-0.37	-0.70	-1.27	-1.14
130°		-0.48	-0.41	-0.28	-0.44	-0.24	-0.42	-0.19	0.02	-0.04	-0.09	-0.68	-0.99
135°		-0.47	-0.38	-0.27	-0.48	-0.43	-0.73	-0.56	-0.29	-0.16	0.07	-0.09	-0.18
140°		-0.40	-0.38	-0.23	-0.47	-0.54	-0.99	-1.03	-0.82	-0.68	-0.33	-0.13	0.23
145°		-0.40	-0.35	-0.20	-0.42	-0.54	-1.09	-1.34	-1.29	-1.29	-1.04	-0.80	-0.20
150°		-0.35	-0.33	-0.13	-0.33	-0.45	-1.03	-1.41	-1.49	-1.70	-1.69	-1.74	-1.26
155°		-0.32	-0.29	-0.08	-0.23	-0.34	-0.90	-1.28	-1.42	-1.73	-1.90	-2.28	-2.17
160°		-0.30	-0.25	-0.02	-0.14	-0.22	-0.75	-1.06	-1.18	-1.47	-1.66	-2.13	-2.25
165°		-0.27	-0.22	0.02	-0.06	-0.11	-0.59	-0.82	-0.87	-1.10	-1.20	-1.57	-1.65
170°		-0.27	-0.20	0.06	0.01	-0.02	-0.44	-0.61	-0.61	-0.77	-0.78	-1.03	-0.98
175°		-0.23	-0.19	0.08	0.05	0.04	-0.36	-0.48	-0.44	-0.56	-0.51	-0.68	-0.55
180°		-0.24	-0.19	0.09	0.05	0.06	-0.34	-0.44	-0.39	-0.50	-0.43	-0.57	-0.41
185°		-0.24	-0.17	0.09	0.04	0.04	-0.36	-0.49	-0.45	-0.57	-0.52	-0.69	-0.56
190°		-0.26	-0.21	0.06	0.01	-0.01	-0.46	-0.62	-0.62	-0.79	-0.79	-1.04	-1.00
195°		-0.29	-0.21	0.04	-0.05	-0.09	-0.58	-0.83	-0.88	-1.11	-1.22	-1.57	-1.67
200°		-0.30	-0.25	-0.01	-0.12	-0.19	-0.72	-1.04	-1.15	-1.47	-1.67	-2.12	-2.27
205°		-0.34	-0.28	-0.06	-0.22	-0.31	-0.91	-1.30	-1.44	-1.78	-1.98	-2.35	-2.24
210°		-0.36	-0.30	-0.12	-0.33	-0.44	-1.08	-1.45	-1.54	-1.78	-1.78	-1.82	-1.32
215°		-0.39	-0.34	-0.17	-0.42	-0.51	-1.12	-1.36	-1.32	-1.34	-1.08	-0.86	-0.26
220°		-0.44	-0.37	-0.23	-0.48	-0.55	-1.08	-1.10	-0.88	-0.74	-0.34	-0.16	0.21
225°		-0.48	-0.38	-0.27	-0.49	-0.42	-0.76	-0.56	-0.27	-0.13	0.14	-0.03	-0.15
230°		-0.48	-0.39	-0.29	-0.45	-0.26	-0.47	-0.21	0.03	-0.01	-0.05	-0.63	-0.95
235°		-0.50	-0.39	-0.28	-0.35	-0.06	-0.23	-0.08	-0.03	-0.33	-0.66	-1.26	-1.13
240°		-0.51	-0.37	-0.24	-0.21	0.16	-0.09	-0.17	-0.34	-0.79	-1.09	-1.22	-0.85
245°		-0.51	-0.35	-0.19	-0.04	0.33	-0.06	-0.40	-0.69	-1.03	-0.99	-0.98	-1.15
250°		-0.49	-0.31	-0.11	0.12	0.45	-0.11	-0.60	-0.77	-0.89	-0.77	-1.23	-1.79
255°		-0.47	-0.29	-0.03	0.24	0.47	-0.25	-0.66	-0.64	-0.74	-0.95	-1.74	-1.49
260°		-0.43	-0.19	0.08	0.32	0.38	-0.43	-0.65	-0.58	-0.92	-1.39	-1.59	-0.81
265°		-0.42	-0.13	0.16	0.35	0.24	-0.51	-0.60	-0.68	-1.24	-1.37	-0.95	-0.82
270°		-0.37	-0.06	0.24	0.32	0.11	-0.47	-0.60	-0.90	-1.27	-0.85	-0.79	-1.01
275°		-0.34	-0.03	0.27	0.25	0.00	-0.42	-0.75	-1.04	-0.96	-0.55	-1.04	-0.62
280°		-0.29	0.04	0.29	0.15	-0.02	-0.34	-0.84	-0.84	-0.56	-0.61	-0.89	-0.38
285°		-0.26	0.06	0.29	0.06	-0.02	-0.39	-0.87	-0.56	-0.49	-0.78	-0.52	-0.64
290°		-0.25	0.12	0.25	-0.02	0.02	-0.47	-0.72	-0.33	-0.62	-0.57	-0.44	-0.67
295°		-0.17	0.12	0.22	-0.07	0.07	-0.57	-0.49	-0.28	-0.71	-0.24	-0.65	-0.35
300°		-0.18	0.14	0.17	-0.10	0.09	-0.64	-0.33	-0.39	-0.59	-0.15	-0.70	-0.23
305°		-0.11	0.14	0.12	-0.09	0.09	-0.62	-0.27	-0.47	-0.34	-0.28	-0.49	-0.36
310°		-0.12	0.14	0.07	-0.05	0.06	-0.53	-0.29	-0.42	-0.15	-0.37	-0.27	-0.43
315°		-0.10	0.11	0.03	-0.02	0.03	-0.39	-0.34	-0.28	-0.11	-0.30	-0.22	-0.28
320°		-0.09	0.12	0.01	-0.01	0.00	-0.25	-0.34	-0.10	-0.15	-0.14	-0.26	-0.05
325°		-0.09	0.09	0.00	0.02	-0.03	-0.15	-0.32	0.02	-0.21	0.03	-0.32	0.09
330°		-0.05	0.05	0.00	0.02	-0.03	-0.07	-0.25	0.08	-0.21	0.10	-0.31	0.11
335°		-0.06	0.04	0.01	0.02	-0.02	-0.03	-0.18	0.09	-0.18	0.12	-0.24	0.07
340°		-0.05	0.04	0.01	0.00	-0.02	0.00	-0.11	0.08	-0.11	0.10	-0.15	0.03
345°		-0.03	0.02	0.00	0.00	-0.01	0.01	-0.06	0.06	-0.05	0.07	-0.08	0.01
350°		-0.02	0.03	0.01	-0.01	0.00	0.02	-0.02	0.04	0.00	0.04	-0.03	0.00
355°		-0.04	0.02	0.00	0.01	0.01	0.02	0.01	0.03	0.03	0.04	0.00	0.01

**Table A.39** Directional response for Windscreen UA-1650, Microphone Type 4966, Microphone Preamplifier ZC-0032 and the analyzer with the microphone preamplifier mounted directly on the analyzer, measured in a plane perpendicular to the display and along the microphone's axis, 4000 Hz – 10600 Hz

Frequency												
Angle	4000 Hz	4500 Hz	5000 Hz	5600 Hz	6300 Hz	7100 Hz	8000 Hz	8500 Hz	9000 Hz	9500 Hz	10000 Hz	10600 Hz
0°	0.02	0.00	-0.01	-0.01	0.00	-0.01	-0.01	-0.01	-0.01	-0.02	-0.01	-0.01
5°	0.00	-0.01	0.00	0.02	0.00	-0.01	-0.02	-0.01	-0.03	-0.01	-0.03	-0.02
10°	-0.02	0.00	-0.02	0.01	-0.01	-0.01	-0.04	0.01	-0.06	0.01	-0.06	-0.04
15°	-0.01	0.02	-0.02	0.01	-0.03	-0.02	-0.07	0.02	-0.10	0.04	-0.10	-0.04
20°	-0.02	0.02	-0.02	0.01	-0.03	-0.03	-0.12	0.05	-0.17	0.08	-0.18	-0.01
25°	-0.05	0.00	-0.03	0.01	-0.06	-0.07	-0.20	0.05	-0.26	0.09	-0.28	0.01
30°	-0.03	0.03	-0.03	0.01	-0.05	-0.10	-0.27	0.06	-0.30	0.08	-0.34	0.07
35°	-0.04	0.02	-0.04	0.00	-0.06	-0.19	-0.34	0.01	-0.29	-0.03	-0.34	0.06
40°	-0.06	0.09	-0.02	0.00	-0.04	-0.29	-0.38	-0.11	-0.24	-0.21	-0.27	-0.08
45°	-0.05	0.09	-0.01	-0.03	-0.01	-0.44	-0.38	-0.28	-0.17	-0.42	-0.21	-0.31
50°	-0.08	0.12	0.03	-0.06	0.03	-0.58	-0.33	-0.44	-0.20	-0.49	-0.28	-0.45
55°	-0.11	0.13	0.07	-0.10	0.05	-0.67	-0.30	-0.50	-0.36	-0.37	-0.55	-0.35
60°	-0.16	0.14	0.13	-0.11	0.06	-0.69	-0.35	-0.43	-0.59	-0.21	-0.82	-0.23
65°	-0.14	0.13	0.18	-0.10	0.03	-0.63	-0.49	-0.35	-0.71	-0.26	-0.78	-0.41
70°	-0.18	0.11	0.23	-0.06	-0.01	-0.52	-0.71	-0.37	-0.64	-0.56	-0.52	-0.79
75°	-0.21	0.07	0.25	0.03	-0.05	-0.42	-0.88	-0.55	-0.51	-0.76	-0.52	-0.75
80°	-0.25	0.05	0.27	0.12	-0.07	-0.39	-0.90	-0.84	-0.60	-0.63	-0.88	-0.44
85°	-0.29	-0.01	0.25	0.22	-0.03	-0.43	-0.79	-1.01	-0.96	-0.53	-1.01	-0.62
90°	-0.30	-0.06	0.21	0.29	0.07	-0.51	-0.66	-0.92	-1.27	-0.84	-0.81	-1.02
95°	-0.39	-0.11	0.15	0.32	0.20	-0.55	-0.63	-0.72	-1.23	-1.36	-0.94	-0.81
100°	-0.41	-0.19	0.07	0.30	0.37	-0.47	-0.67	-0.60	-0.91	-1.38	-1.55	-0.76
105°	-0.41	-0.25	-0.01	0.22	0.45	-0.31	-0.71	-0.70	-0.77	-0.95	-1.75	-1.47
110°	-0.45	-0.31	-0.10	0.10	0.45	-0.16	-0.65	-0.83	-0.92	-0.77	-1.24	-1.79
115°	-0.50	-0.34	-0.17	-0.04	0.36	-0.06	-0.42	-0.69	-1.04	-0.98	-0.94	-1.12
120°	-0.49	-0.38	-0.23	-0.20	0.19	-0.07	-0.18	-0.36	-0.82	-1.11	-1.18	-0.81
125°	-0.46	-0.40	-0.27	-0.34	-0.03	-0.20	-0.08	-0.05	-0.37	-0.70	-1.27	-1.14
130°	-0.48	-0.41	-0.28	-0.44	-0.24	-0.42	-0.19	0.02	-0.04	-0.09	-0.68	-0.99
135°	-0.47	-0.38	-0.27	-0.48	-0.43	-0.73	-0.56	-0.29	-0.16	0.07	-0.09	-0.18
140°	-0.40	-0.38	-0.23	-0.47	-0.54	-0.99	-1.03	-0.82	-0.68	-0.33	-0.13	0.23
145°	-0.40	-0.35	-0.20	-0.42	-0.54	-1.09	-1.34	-1.29	-1.29	-1.04	-0.80	-0.20
150°	-0.35	-0.33	-0.13	-0.33	-0.45	-1.03	-1.41	-1.49	-1.70	-1.69	-1.74	-1.26
155°	-0.32	-0.29	-0.08	-0.23	-0.34	-0.90	-1.28	-1.42	-1.73	-1.90	-2.28	-2.17
160°	-0.30	-0.25	-0.02	-0.14	-0.22	-0.75	-1.06	-1.18	-1.47	-1.66	-2.13	-2.25
165°	-0.27	-0.22	0.02	-0.06	-0.11	-0.59	-0.82	-0.87	-1.10	-1.20	-1.57	-1.65
170°	-0.27	-0.20	0.06	0.01	-0.02	-0.44	-0.61	-0.61	-0.77	-0.78	-1.03	-0.98
175°	-0.23	-0.19	0.08	0.05	0.04	-0.36	-0.48	-0.44	-0.56	-0.51	-0.68	-0.55
180°	-0.24	-0.19	0.09	0.05	0.06	-0.34	-0.44	-0.39	-0.50	-0.43	-0.57	-0.41
185°	-0.24	-0.17	0.09	0.04	0.04	-0.36	-0.49	-0.45	-0.57	-0.52	-0.69	-0.56
190°	-0.26	-0.21	0.06	0.01	-0.01	-0.46	-0.62	-0.62	-0.79	-0.79	-1.04	-1.00
195°	-0.29	-0.21	0.04	-0.05	-0.09	-0.58	-0.83	-0.88	-1.11	-1.22	-1.57	-1.67
200°	-0.30	-0.25	-0.01	-0.12	-0.19	-0.72	-1.04	-1.15	-1.47	-1.67	-2.12	-2.27
205°	-0.34	-0.28	-0.06	-0.22	-0.31	-0.91	-1.30	-1.44	-1.78	-1.98	-2.35	-2.24
210°	-0.36	-0.30	-0.12	-0.33	-0.44	-1.08	-1.45	-1.54	-1.78	-1.78	-1.82	-1.32
215°	-0.39	-0.34	-0.17	-0.42	-0.51	-1.12	-1.36	-1.32	-1.34	-1.08	-0.86	-0.26
220°	-0.44	-0.37	-0.23	-0.48	-0.55	-1.08	-1.10	-0.88	-0.74	-0.34	-0.16	0.21
225°	-0.48	-0.38	-0.27	-0.49	-0.42	-0.76	-0.56	-0.27	-0.13	0.14	-0.03	-0.15
230°	-0.48	-0.39	-0.29	-0.45	-0.26	-0.47	-0.21	0.03	-0.01	-0.05	-0.63	-0.95
235°	-0.50	-0.39	-0.28	-0.35	-0.06	-0.23	-0.08	-0.03	-0.33	-0.66	-1.26	-1.13
240°	-0.51	-0.37	-0.24	-0.21	0.16	-0.09	-0.17	-0.34	-0.79	-1.09	-1.22	-0.85
245°	-0.51	-0.35	-0.19	-0.04	0.33	-0.06	-0.40	-0.69	-1.03	-0.99	-0.98	-1.15
250°	-0.49	-0.31	-0.11	0.12	0.45	-0.11	-0.60	-0.77	-0.89	-0.77	-1.23	-1.79
255°	-0.47	-0.29	-0.03	0.24	0.47	-0.25	-0.66	-0.64	-0.74	-0.95	-1.74	-1.49
260°	-0.43	-0.19	0.08	0.32	0.38	-0.43	-0.65	-0.58	-0.92	-1.39	-1.59	-0.81
265°	-0.42	-0.13	0.16	0.35	0.24	-0.51	-0.60	-0.68	-1.24	-1.37	-0.95	-0.82
270°	-0.37	-0.06	0.24	0.32	0.11	-0.47	-0.60	-0.90	-1.27	-0.85	-0.79	-1.01
275°	-0.34	-0.03	0.27	0.25	0.00	-0.42	-0.75	-1.04	-0.96	-0.55	-1.04	-0.62
280°	-0.29	0.04	0.29	0.15	-0.02	-0.34	-0.84	-0.84	-0.56	-0.61	-0.89	-0.38
285°	-0.26	0.06	0.29	0.06	-0.02	-0.39	-0.87	-0.56	-0.49	-0.78	-0.52	-0.64
290°	-0.25	0.12	0.25	-0.02	0.02	-0.47	-0.72	-0.33	-0.62	-0.57	-0.44	-0.67
295°	-0.17	0.12	0.22	-0.07	0.07	-0.57	-0.49	-0.28	-0.71	-0.24	-0.65	-0.35
300°	-0.18	0.14	0.17	-0.10	0.09	-0.64	-0.33	-0.39	-0.59	-0.15	-0.70	-0.23
305°	-0.11	0.14	0.12	-0.09	0.09	-0.62	-0.27	-0.47	-0.34	-0.28	-0.49	-0.36
310°	-0.12	0.14	0.07	-0.05	0.06	-0.53	-0.29	-0.42	-0.15	-0.37	-0.27	-0.43
315°	-0.10	0.11	0.03	-0.02	0.03	-0.39	-0.34	-0.28	-0.11	-0.30	-0.22	-0.28
320°	-0.09	0.12	0.01	-0.01	0.00	-0.25	-0.34	-0.10	-0.15	-0.14	-0.26	-0.05
325°	-0.09	0.09	0.00	0.02	-0.03	-0.15	-0.32	0.02	-0.21	0.03	-0.32	0.09
330°	-0.05	0.05	0.00	0.02	-0.03	-0.07	-0.25	0.08	-0.21	0.10	-0.31	0.11
335°	-0.06	0.04	0.01	0.02	-0.02	-0.03	-0.18	0.09	-0.18	0.12	-0.24	0.07
340°	-0.05	0.04	0.01	0.00	-0.02	0.00	-0.11	0.08	-0.11	0.10	-0.15	0.03
345°	-0.03	0.02	0.00	0.00	-0.01	0.01	-0.06	0.06	-0.05	0.07	-0.08	0.01
350°	-0.02	0.03	0.01	-0.01	0.00	0.02	-0.02	0.04	0.00	0.04	-0.03	0.00
355°	-0.04	0.02	0.00	0.01	0.01	0.02	0.02	0.01	0.03	0.04	0.00	0.01

**Microphone Type 4966 for Hand-held Analyzer Types 2250, 2250-L and 2270 –  
Supplement to Instruction Manual BE 1712**

**Table A.40** Directional response for Windscreen UA-1650, Microphone Type 4966, Microphone Preamplifier ZC-0032 and the analyzer with the microphone preamplifier mounted directly on the analyzer, measured in a plane perpendicular to the display and along the microphone's axis, 11200 Hz – 20000 Hz

Frequency												
Angle		11200 Hz	11800 Hz	12500 Hz	13200 Hz	14000 Hz	15000 Hz	16000 Hz	17000 Hz	18000 Hz	19000 Hz	20000 Hz
0°		-0.01	-0.01	-0.01	-0.01	-0.01	0.01	-0.01	-0.02	-0.04	-0.02	-0.02
5°		-0.06	-0.10	-0.07	-0.07	-0.09	-0.03	-0.06	-0.12	-0.08	-0.12	-0.13
10°		-0.14	-0.23	-0.22	-0.15	-0.26	-0.19	-0.21	-0.22	-0.25	-0.25	-0.30
15°		-0.24	-0.39	-0.38	-0.21	-0.42	-0.58	-0.40	-0.48	-0.40	-0.50	-0.53
20°		-0.49	-0.60	-0.41	-0.45	-0.57	-1.05	-0.78	-0.67	-0.84	-0.95	-0.95
25°		-0.96	-1.14	-0.66	-0.80	-1.10	-1.46	-1.21	-1.02	-1.13	-1.63	-1.47
30°		-1.25	-1.56	-1.18	-1.25	-1.26	-1.81	-1.80	-1.54	-1.67	-2.36	-2.21
35°		-1.54	-1.94	-1.35	-1.68	-1.65	-2.16	-2.57	-2.32	-2.01	-2.81	-2.89
40°		-2.05	-2.43	-2.25	-2.33	-1.88	-2.68	-3.12	-2.91	-2.48	-3.26	-3.72
45°		-2.09	-2.76	-2.61	-2.48	-2.58	-3.25	-3.45	-3.60	-3.33	-3.88	-4.33
50°		-2.44	-3.33	-2.95	-3.38	-3.31	-3.38	-4.07	-4.31	-4.43	-4.52	-4.89
55°		-3.22	-3.52	-3.81	-3.94	-3.85	-4.24	-4.84	-4.55	-5.32	-5.83	-5.96
60°		-3.28	-4.01	-4.06	-4.47	-4.44	-4.92	-5.67	-5.91	-5.99	-6.65	-7.07
65°		-3.75	-4.58	-4.33	-5.24	-4.77	-5.85	-6.46	-6.81	-7.06	-7.32	-8.28
70°		-4.22	-5.11	-4.91	-5.84	-5.47	-6.51	-7.07	-7.64	-8.07	-8.33	-9.28
75°		-4.73	-5.56	-5.47	-6.16	-6.37	-7.00	-7.86	-8.46	-8.78	-9.78	-10.35
80°		-4.51	-6.14	-5.99	-6.68	-6.81	-7.92	-8.69	-9.11	-9.37	-10.69	-11.47
85°		-5.27	-5.89	-6.81	-7.14	-7.42	-8.32	-9.82	-9.77	-10.20	-10.94	-12.14
90°		-5.67	-6.62	-6.96	-7.92	-8.00	-9.30	-10.02	-11.09	-10.77	-11.55	-13.44
95°		-6.20	-7.30	-7.53	-8.39	-8.51	-9.65	-10.82	-10.68	-11.83	-12.77	-14.83
100°		-6.70	-7.27	-8.73	-8.90	-8.88	-10.12	-10.81	-11.08	-12.44	-13.58	-15.76
105°		-6.90	-7.40	-8.77	-9.38	-10.20	-10.35	-11.42	-12.03	-12.96	-14.18	-15.65
110°		-6.95	-7.47	-8.54	-9.18	-10.67	-10.88	-12.55	-12.42	-13.74	-14.55	-16.07
115°		-6.93	-7.84	-8.61	-8.77	-10.19	-11.19	-13.28	-12.69	-14.35	-15.62	-16.64
120°		-6.93	-8.12	-8.48	-9.39	-10.52	-10.69	-12.36	-12.95	-15.15	-15.51	-18.02
125°		-7.48	-8.90	-8.68	-9.62	-10.65	-11.01	-12.26	-13.25	-13.54	-15.01	-17.03
130°		-7.41	-8.36	-8.76	-10.61	-11.41	-11.15	-12.18	-13.68	-13.65	-15.68	-17.06
135°		-8.01	-8.51	-9.46	-11.16	-10.46	-10.94	-12.63	-15.09	-13.73	-15.08	-17.61
140°		-8.73	-10.12	-11.25	-11.99	-10.69	-11.64	-13.74	-15.73	-13.43	-14.33	-18.20
145°		-7.41	-9.54	-10.66	-11.81	-11.62	-13.18	-15.88	-16.17	-14.63	-15.81	-20.77
150°		-6.23	-7.05	-7.72	-8.73	-9.79	-12.03	-14.17	-14.04	-14.22	-17.30	-21.49
155°		-6.71	-8.31	-8.79	-9.06	-8.89	-10.39	-11.27	-10.96	-11.98	-15.32	-17.61
160°		-5.11	-6.05	-6.55	-7.24	-8.14	-10.51	-12.35	-12.24	-12.66	-15.00	-15.39
165°		-7.70	-8.07	-7.68	-7.67	-7.76	-9.54	-10.46	-9.80	-10.94	-13.77	-14.45
170°		-11.40	-12.90	-13.14	-13.45	-13.49	-14.79	-15.41	-15.39	-15.21	-16.99	-16.53
175°		-7.99	-9.24	-9.84	-10.84	-11.76	-13.80	-14.87	-14.78	-16.24	-20.40	-20.59
180°		-6.50	-7.45	-7.76	-8.47	-9.36	-11.20	-11.99	-11.54	-12.69	-15.81	-16.16
185°		-7.91	-9.09	-9.55	-10.48	-11.66	-13.82	-14.72	-14.89	-16.44	-19.75	-21.09
190°		-11.48	-12.95	-13.35	-13.88	-14.65	-15.92	-16.45	-15.27	-15.96	-19.30	-18.39
195°		-8.30	-8.70	-8.36	-8.60	-8.77	-10.48	-11.43	-11.02	-11.73	-15.42	-15.85
200°		-5.30	-6.31	-6.82	-7.76	-8.70	-11.18	-13.11	-12.84	-13.23	-16.50	-16.31
205°		-6.82	-8.55	-9.48	-9.91	-9.73	-10.93	-11.86	-11.44	-11.77	-15.77	-17.79
210°		-6.73	-7.64	-8.47	-9.36	-10.08	-12.01	-13.75	-13.39	-13.50	-16.66	-21.56
215°		-7.71	-9.76	-11.33	-11.81	-11.28	-12.72	-15.47	-15.78	-14.52	-16.51	-20.45
220°		-9.04	-10.69	-11.81	-11.99	-10.39	-11.06	-13.10	-15.08	-13.04	-14.55	-18.67
225°		-8.29	-8.39	-9.22	-10.77	-10.14	-10.41	-12.26	-14.42	-13.71	-16.43	-18.25
230°		-7.15	-8.11	-8.58	-10.07	-11.20	-11.35	-12.46	-13.52	-13.10	-15.70	-16.45
235°		-7.12	-8.81	-9.09	-10.14	-11.18	-10.75	-11.41	-11.92	-13.06	-15.51	-17.31
240°		-7.29	-8.38	-8.91	-9.15	-9.82	-9.82	-11.52	-12.72	-15.12	-15.90	-18.19
245°		-7.00	-7.63	-8.68	-7.97	-9.56	-10.70	-12.96	-12.89	-13.88	-15.23	-15.94
250°		-6.99	-7.13	-8.11	-8.76	-10.63	-10.65	-11.88	-12.56	-13.15	-14.40	-15.40
255°		-6.68	-7.17	-8.37	-9.41	-9.93	-9.98	-10.53	-11.58	-12.71	-14.09	-15.32
260°		-6.53	-7.12	-8.83	-9.00	-8.30	-9.14	-10.28	-10.82	-12.18	-13.46	-15.29
265°		-6.12	-7.28	-7.57	-7.85	-7.89	-9.35	-10.27	-10.29	-10.86	-12.79	-14.68
270°		-5.67	-6.27	-6.31	-7.67	-8.08	-8.69	-9.22	-10.68	-10.73	-11.57	-12.66
275°		-4.78	-5.47	-6.64	-7.30	-6.95	-7.58	-9.33	-9.90	-9.77	-10.68	-12.12
280°		-4.21	-6.07	-6.11	-6.25	-6.29	-7.75	-8.26	-8.78	-9.06	-10.86	-11.02
285°		-4.78	-5.53	-5.08	-5.84	-6.49	-6.56	-7.11	-8.12	-8.54	-9.44	-10.37
290°		-4.21	-4.73	-4.62	-6.13	-5.07	-5.97	-6.75	-7.34	-7.52	-8.35	-9.44
295°		-3.44	-4.18	-4.52	-5.05	-4.21	-5.85	-6.01	-6.34	-6.65	-7.23	-8.23
300°		-2.94	-3.98	-3.97	-3.94	-4.37	-4.60	-5.17	-5.49	-5.73	-6.59	-7.05
305°		-3.23	-3.56	-3.43	-3.77	-3.89	-3.62	-4.58	-4.57	-4.88	-5.91	-5.77
310°		-2.49	-3.06	-2.56	-3.64	-2.65	-3.32	-3.87	-3.83	-4.01	-4.53	-4.84
315°		-2.06	-2.41	-2.65	-2.32	-2.30	-2.99	-3.13	-3.58	-3.09	-3.78	-4.13
320°		-1.83	-2.12	-2.44	-1.77	-1.98	-2.39	-2.73	-2.74	-2.17	-3.31	-3.66
325°		-1.30	-1.97	-1.21	-1.47	-1.73	-1.76	-2.49	-2.12	-1.89	-2.67	-2.88
330°		-1.00	-1.70	-0.81	-1.33	-1.12	-1.61	-1.77	-1.23	-1.60	-2.23	-2.24
335°		-0.93	-1.18	-0.26	-1.09	-0.65	-1.40	-1.01	-0.90	-0.98	-1.56	-1.46
340°		-0.59	-0.47	-0.12	-0.75	-0.21	-1.16	-0.51	-0.68	-0.77	-0.97	-0.85
345°		-0.29	-0.26	-0.15	-0.39	-0.18	-0.66	-0.14	-0.45	-0.33	-0.47	-0.46
350°		-0.16	-0.15	-0.11	-0.18	-0.17	-0.24	0.00	-0.14	-0.11	-0.18	-0.17
355°		-0.05	0.01	-0.02	-0.01	-0.04	-0.03	0.06	0.02	-0.03	-0.01	0.02

**Table A.41** Sensitivity variations of Windscreen UA-1650, Microphone Type 4966, Microphone Preamplifier ZC-0032 and the analyzer with the microphone preamplifier mounted directly on the analyzer, at sound incidence angles within  $\pm\theta^\circ$  from the reference direction

Nominal Frequency	Exact Frequency	Max Variation $\pm 30^\circ$ dB	Max Variation $\pm 90^\circ$ dB	Max Variation $\pm 150^\circ$ dB
<b>500 Hz</b>	0.501 Hz	0.08	0.40	0.54
<b>630 Hz</b>	0.631 Hz	0.07	0.23	0.55
<b>800 Hz</b>	0.794 Hz	0.04	0.33	0.58
<b>1000 Hz</b>	1000 Hz	0.04	0.44	0.84
<b>1250 Hz</b>	1.259 Hz	0.07	0.19	1.03
<b>1600 Hz</b>	1.585 Hz	0.16	0.73	1.15
<b>2000 Hz</b>	1.995 Hz	0.33	0.91	1.46
2240 Hz	2.239 Hz	0.10	1.16	1.64
<b>2500 Hz</b>	2.512 Hz	0.33	1.30	1.80
2800 Hz	2.818 Hz	0.16	1.08	1.92
<b>3150 Hz</b>	3.162 Hz	0.40	1.18	1.83
3550 Hz	3.548 Hz	0.24	1.21	2.02
<b>4000 Hz</b>	3.981 Hz	0.26	1.39	2.36
4500 Hz	4.467 Hz	0.44	1.82	2.74
<b>5000 Hz</b>	5.012 Hz	0.44	1.54	3.16
5600 Hz	5.623 Hz	0.59	2.88	4.31
<b>6300 Hz</b>	6.310 Hz	0.78	3.02	4.60
7100 Hz	7.079 Hz	0.40	2.42	4.33
<b>8000 Hz</b>	7.943 Hz	0.79	3.64	5.80
8500 Hz	8.414 Hz	1.11	4.11	6.53
9000 Hz	8.913 Hz	0.85	4.54	7.44
9500 Hz	9.441 Hz	1.00	5.36	7.80
<b>10000 Hz</b>	10000 Hz	0.74	5.62	8.57
10600 Hz	10.593 Hz	0.94	5.43	8.45
11200 Hz	11.220 Hz	1.26	5.97	9.05
11800 Hz	11.885 Hz	1.73	6.65	10.71
<b>12500 Hz</b>	12.589 Hz	1.19	6.97	11.82
13200 Hz	13.335 Hz	1.42	7.93	12.45
14000 Hz	14.125 Hz	1.27	8.09	12.69
15000 Hz	14.962 Hz	1.83	9.31	13.30
<b>16000 Hz</b>	15.849 Hz	1.86	10.08	15.94
17000 Hz	16.788 Hz	1.58	11.13	17.12
18000 Hz	17.783 Hz	1.71	10.81	16.95
19000 Hz	18.836 Hz	2.38	11.80	17.66
<b>20000 Hz</b>	19.953 Hz	2.28	13.46	21.58

**Table A.42** Microphone Type 4966 is not specified together with Outdoor Microphone Kit UA-1404

**Table A.43** Microphone Type 4966 is not specified together with Outdoor Microphone Kit UA-1404

**Table A.44** Microphone Type 4966 is not specified together with Outdoor Microphone Kit UA-1404

**Table A.45** Microphone Type 4966 is not specified together with Outdoor Microphone Kit UA-1404

**Table A.46** Microphone Type 4966 is not specified together with Outdoor Microphone Kit UA-1404

**Table A.47** Microphone Type 4966 is not specified together with Outdoor Microphone Kit UA-1404

**Table A.48** Microphone Type 4966 is not specified together with Outdoor Microphone Kit UA-1404

## A.6 Periodic Testing of Acoustical Frequency Responses

This section gives the adjustment data that must be applied to sound levels displayed in response to the sound pressure produced by Multifunction Acoustic Calibrator Type 4226, or in response to simulation of sound pressure by Electrostatic Actuator UA-0033, in order to obtain the equivalent sound levels that would be displayed under reference environmental conditions in response to plane progressive sinusoidal sound waves incident from the reference direction. See Table A.49 and Table A.50 to view the data.

**Table A.49** Acoustical test with Multifunction Acoustic Calibrator Type 4226. Adjustment data that must be applied to the readings of the analyzer in order to obtain equivalent sound levels that would be displayed in response to plane progressive sinusoidal sound waves incident from the reference direction

Nominal Frequency	Correction Data For Preamplifier Connected to an Extension Cable	Expanded Uncertainty	Correction Data	Expanded Uncertainty
			For Preamplifier Mounted Directly on the analyzer	
			dB	dB
<b>31.5 Hz</b>	-0.07	0.10	-0.07	0.12
<b>63 Hz</b>	-0.02	0.06	-0.02	0.12
<b>125 Hz</b>	0.00	0.06	0.00	0.11
<b>250 Hz</b>	0.01	0.06	0.07	0.11
<b>500 Hz</b>	0.01	0.07	0.24	0.12
<b>1000 Hz</b>	0.06	0.09	-0.01	0.13
<b>2000 Hz</b>	0.25	0.12	0.16	0.15
<b>4000 Hz</b>	0.94	0.13	0.85	0.20
<b>8000 Hz</b>	2.88	0.17	2.80	0.26
<b>12500 Hz</b>	5.17	0.26	5.32	0.33
<b>16000 Hz</b>	6.36	0.36	6.47	0.41

**Table A.50** Acoustical test with Electrostatic Actuator UA-0033. Adjustment data that must be applied to the readings of the analyzer in order to obtain equivalent sound levels that would be displayed in response to plane progressive sinusoidal sound waves incident from the reference direction

Nominal Frequency	Exact Frequency	Correction Data For Preamplifier Connected to an Extension Cable	Expanded Uncertainty	Correction Data	Expanded Uncertainty
				For Preamplifier Mounted Directly on the analyzer	
				dB	dB
<b>31.5 Hz</b>	31.6228 Hz	-0.06	0.05	-0.06	0.11
<b>63 Hz</b>	63.0957 Hz	-0.03	0.04	-0.03	0.11
<b>125 Hz</b>	125.893 Hz	-0.01	0.04	0.00	0.11
<b>250 Hz</b>	251.189 Hz	0.00	0.04	0.06	0.11
<b>500 Hz</b>	501.187 Hz	0.02	0.06	0.24	0.12
<b>1000 Hz</b>	1000 Hz	0.08	0.08	0.01	0.13
<b>2000 Hz</b>	1995.26 Hz	0.29	0.10	0.20	0.14
<b>4000 Hz</b>	3981.07 Hz	1.09	0.13	1.00	0.20
<b>8000 Hz</b>	7943.28 Hz	3.41	0.16	3.32	0.25
<b>12500 Hz</b>	12589.3 Hz	7.34	0.28	7.49	0.34
<b>16000 Hz</b>	15848.9 Hz	8.67	0.37	8.78	0.42

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