

Introduction of Microphones

The various microphones can be divided into Seven product lines.

The differences between these lines are the dimensions and internal design. The different product lines with their nominal specifications for the standard response curves and A-weighted equivalent noise performance are:

Series	Dimensions	Sensitivity	Noise level
1M000	5.54 x 3.95 x 2.23 mm	-33 dB @ 1kHz re.1V/Pa	23.0 dB SPL
1P000	5.54 x 3.95 x 2.23 mm	-30 dB @ 1kHz re.1V/Pa	22.0 dB SPL
6000	3.58 x 3.58 x 1.32 mm	-37 dB @ 1kHz re.1V/Pa	26.5 dB SPL
6200	3.58 x 3.58 x 1.32 mm	-34 dB @ 1kHz re.1V/Pa	24.5 dB SPL
6300	3.58 x 3.58 x 1.71 mm	-35 dB @ 1kHz re.1V/Pa	25.5 dB SPL
6600	3.58 x 3.58 x 1.32 mm	-33 dB @ 1kHz re.1V/Pa	26.5 dB SPL
8000	2.56 x 2.56 mm	-33.5 dB @ 1kHz re.1V/Pa	25.0 dB SPL
9000	3.58 x 3.58 x 2.23 mm	-33 dB @ 1kHz re.1V/Pa	24.0 dB SPL

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Signal Ports

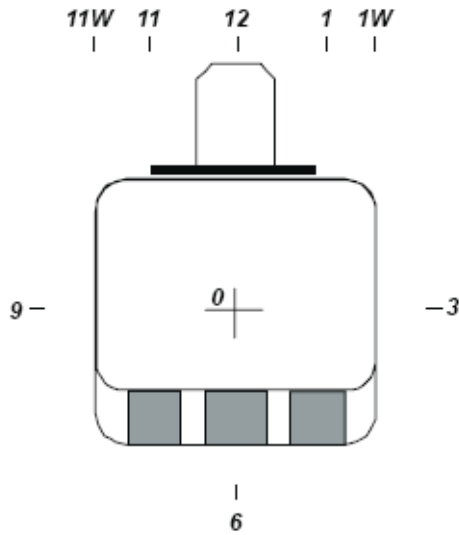
Signal port naming for 6000, 6200, 6300/6400, 6600 and 9000 series microphone.

View is presented with the front (cover) of the microphone. The numbers correspond to positions on a clock face with terminals at 6 o'clock and they denote the location of the signal port. Letters give further information on port location and type. Please note for the 6000 series there are no ports available on the cover.

Different signal ports are available:

Port	Diameter	Length
b	1mm [.039in]	1.5mm [.059in]
h	1mm [.039in]	1.5mm [.059in]*
r	1mm [.039in]	1.5mm [.059in]
u	1mm [.039in]	0.7mm [.059in]
sl	1.4mm [.055in]	1.5mm [.059in]
d	1.4mm [.055in]	1.5mm [.059in]*

* Signal port has different flange.



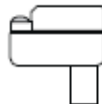
j = cover
k = case



j p = tube perpendicular to cover



n = no tube

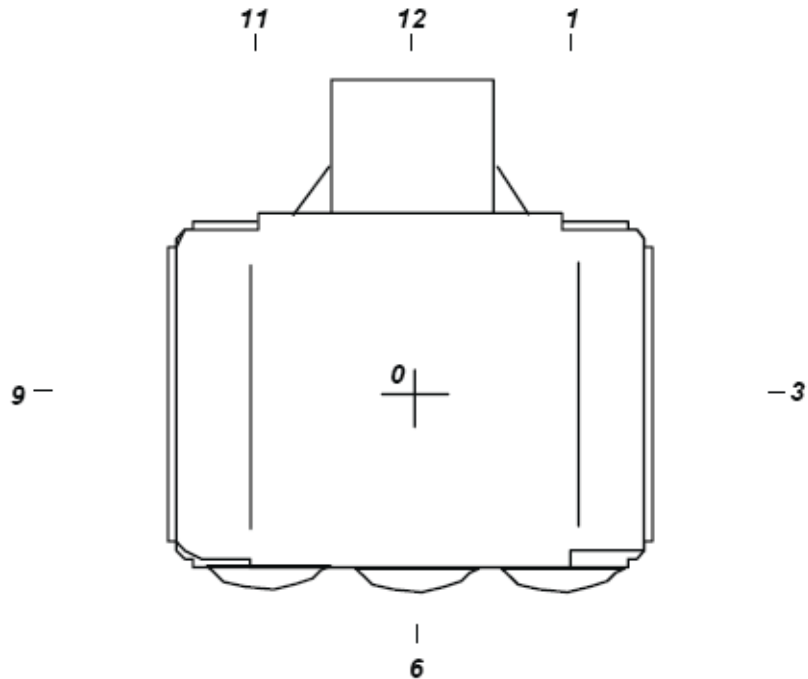


12kp = tube perpendicular to case B-spout

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Signal port naming for 100 series microphone.

View looking at the front (cover) of the microphone.



n = no tube



Jp = tube perpendicular to cover



s = tube on centre line of thickness



Kp = tube perpendicular to case

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100 Series Omni Directional Microphone

Low frequency roll off.

The low frequency roll off is determined by the diameter of the pressure equalization hole in the diaphragm:

Response curve	Hole Diameter
Standard	61µm
6 dB ski slope	120µm
12 dB ski slope	200µm

Signal level at the peak frequency

The signal level at the peak frequency is achieved by internal modification of the microphone.

Circuitry

The used electronic circuit consists of a P-channel MOSFET together with EMI noise blocking capacitors.

Noise

The diameter of the pressure equalization hole influences the noise level. A larger equalization hole will increase the noise level.



Circuit Parameter	Value @ 0.9V
Output impedance	4.8kΩ typ.
Drain current	19µA typ.
Eq. EMI noise @ 0.9GHz*	30dB SPL max.
Eq. EMI noise @ 1.9GHz*	35dB SPL max.
PSR	14dB
ESD protection level**	Class 3

* According SMI 255.

** ESD protection level according to MIL-STD-750D, test method 1020.2. Apply protection in accordance with IEC 61340-5-1 and 61340-5-2.

Sensitivity level

There are two types of circuits 1P000 and 1M000 available resulting in two sensitivity levels: -30dB and -33dB. (with noise levels of 22dB SPL and 23dB SPL)

Port locations

Available port locations for 100 series microphone are: 12s, 3s, 0Kp

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6000 Series Omni Directional Microphone

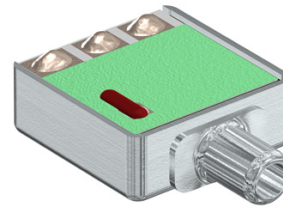
Low frequency roll off.

The low frequency roll off is determined by the active filtering of the electronic circuit. This electronic filtering minimizes the pressure equalization hole in the diaphragm as a result the deviation in the frequency is very small.

Signal level at the peak frequency

The damping screen in the sound inlet determines the signal level at the peak frequency. The transmission of the screen determines the damping: The lower the transmission the higher the damping. The transmission of the screen is noted in percentages.

Response curve	Damping screen
Undamped	No damping screen
Standard	25%
Damped peak	11%



Circuit Parameter	Value @ 0.9V
Output impedance	4.5kΩ typ.
Drain current	21μA typ.
Eq. EMI noise @ 0.9GHz*	35dB SPL max.
Eq. EMI noise @ 1.9GHz*	35dB SPL max.
PSR	16dB
ESD protection level**	Class 3

* According SMI 255.

** ESD protection level according to MIL-STD-750D, test method 1020.2. Apply protection in accordance with IEC 61340-5-1 and 61340-5-2.

Circuitry

The used electronic circuit consists of a P-channel MOSFET together with EMI noise blocking capacitors.

Noise

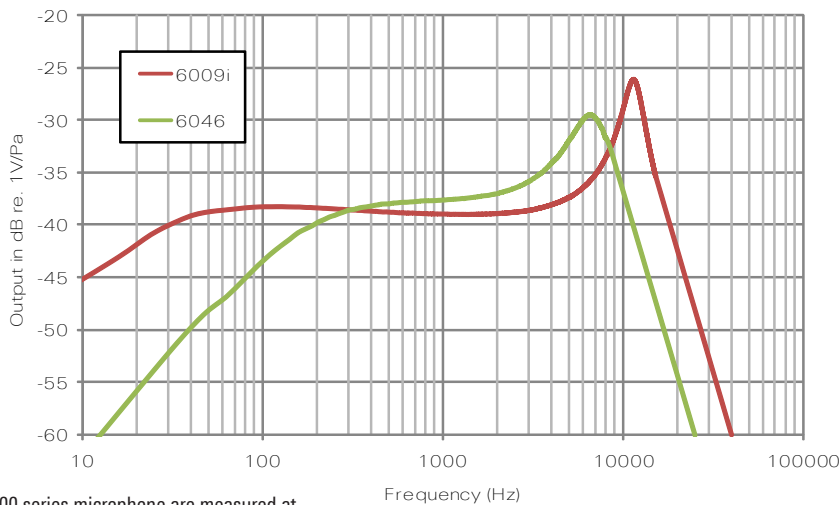
The diameter of the pressure equalization hole influences the noise level. Since the electronic circuit determines the roll off frequency the pressure equalization hole is kept small. This results in a very low noise at low frequencies.

Port locations

Available port locations for 6000 series microphone are: 12h, 12n, 0Kn

Curves

Currently there are two different response curves available; the standard curve and the damped peak response curve.



Response curves of the 6000 series microphone are measured at 0.9V.

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6200 Series Omni Directional Microphone

Low frequency roll off.

The low frequency roll off is determined by the active filtering of the electronic circuit. This electronic filtering minimizes the pressure equalization hole in the diaphragm as a result the deviation in the frequency is very small.

Signal level at the peak frequency

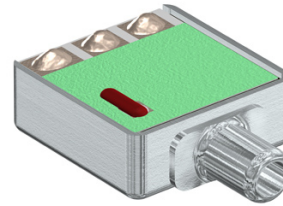
The electronic filtering determines the signal level at the peak frequency.

Circuitry

The electronic filtering determines the signal level at the peak frequency.

Noise

The diameter of the pressure equalization hole influences the noise level. Since the electronic circuit determines the roll off frequency the pressure equalization hole is kept small. This results in a very low noise at low frequencies



Circuit Parameter	Value @ 0.9V
Output impedance	3.9kΩ typ.
Drain current	17μA typ.
Eq. EMI noise @ 0.9GHz*	30dB SPL max.
Eq. EMI noise @ 1.9GHz*	25dB SPL max.
PSR	12dB
ESD protection level**	Class 2

* According SMI 255.

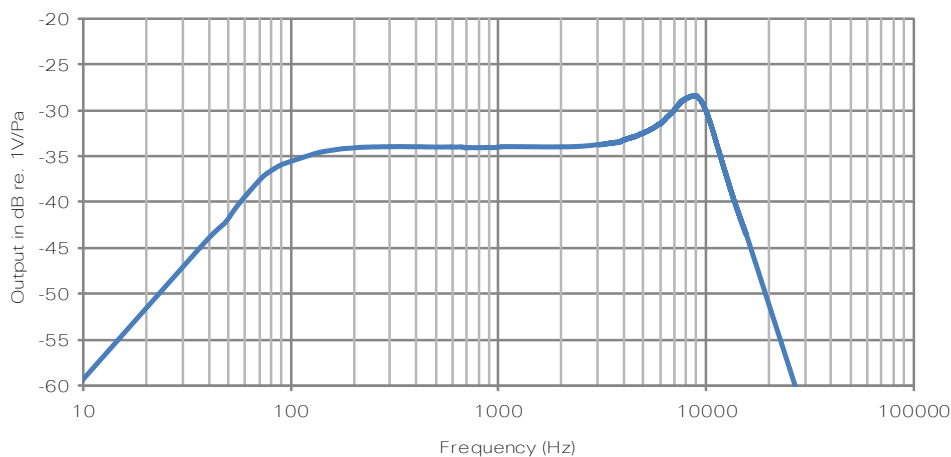
** ESD protection level according to MIL-STD-750D, test method 1020.2. Apply protection in accordance with IEC 61340-5-1 and 61340-5-2.

Port locations

Available port locations for 6200 series microphone are: 12h, 12n, 12u

Curves

Currently there are two different response curves available; the standard curve and the damped peak response curve.



Response curve of the 6200 series microphone is measured at 0.9V.

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6300/6400 Series Omni Directional Microphone

The 6300 series microphone has a sound inlet with 1 mm diameter and the 6400 has a sound inlet diameter of 1.4mm diameter.

Low frequency roll off.

The low frequency roll off is determined by the active filtering of the electronic circuit.

This electronic filtering minimizes the pressure equalization hole in the diaphragm as a result the deviation in the frequency is very small.

Signal level at the peak frequency

The damping screen in the sound inlet determines the signal level at the peak frequency. The transmission of the screen determines the damping: The lower the transmission the higher the damping. The transmission of the screen is noted in percentages.

Response curve	Damping screen
Undamped	No damping screen
Standard	25%
Damped peak	11%

Circuitry

The used electronic circuit consists of a P-channel MOSFET together with EMI noise blocking capacitors.

Noise

The diameter of the pressure equalization hole influences the noise level. Since the electronic circuit determines the roll off frequency the pressure equalization hole is kept small. This results in a very low noise at low frequencies.



Circuit Parameter	Value @ 0.9V
Output impedance	4.5k Ω typ.
Drain current	21 μ A typ.
Eq. EMI noise @ 0.9GHz*	30dB SPL max.
Eq. EMI noise @ 1.9GHz*	35dB SPL max.
PSR	16dB
ESD protection level**	Class 3

* According SMI 255.

** ESD protection level according to MIL-STD-750D, test method 1020.2. Apply protection in accordance with IEC 61340-5-1 and 61340-5-2.

Port locations

Available port locations for 6300/6400 series microphone are: 12b, 12n, 12d, 12Kp

Curves

Currently there are two different response curves available; the standard curve and the damped peak response curve.

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6600 Series Omni Directional Microphone

Low frequency roll off.

The low frequency roll off is determined by the active filtering of the electronic circuit. This electronic filtering minimizes the pressure equalization hole in the diaphragm as a result the deviation in the frequency is very small.

Signal level at the peak frequency

The electronic filtering determines the signal level at the peak frequency.

Ultrasonic filtering

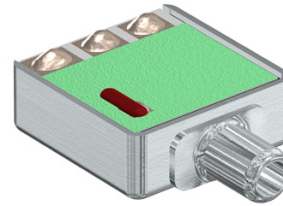
In order to reduce influences of ultrasonic sounds around 25kHz, this model of microphone is equipped with an extra steep filter.

Circuitry

The used electronic circuit consists of a P-channel MOSFET together with EMI noise blocking capacitors.

Noise

The diameter of the pressure equalization hole influences the noise level. Since the electronic circuit determines the roll off frequency the pressure equalization hole is kept small. This results in a very low noise at low frequencies.



Circuit Parameter	Value @ 0.9V
Output impedance	4.1kΩ typ.
Drain current	30μA typ.
Eq. EMI noise @ 0.9GHz*	25dB SPL max.
Eq. EMI noise @ 1.9GHz*	25dB SPL max.
PSR	33dB
ESD protection level**	Class 2

* According SMI 255.

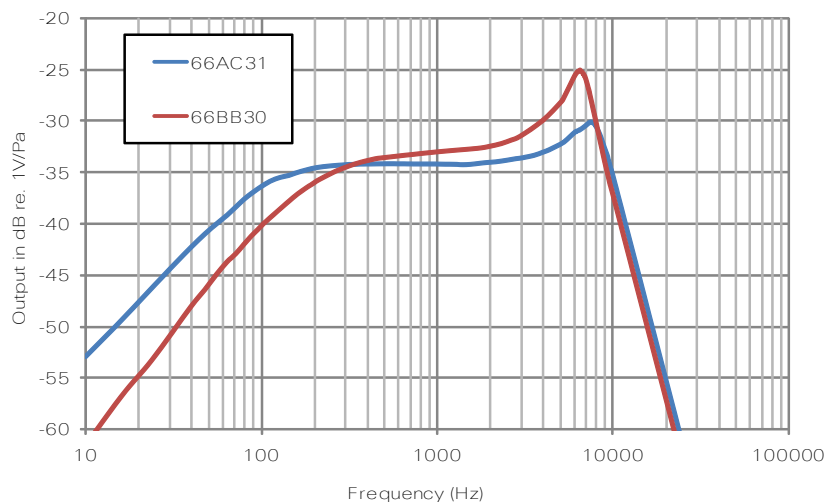
** ESD protection level according to MIL-STD-750D, test method 1020.2. Apply protection in accordance with IEC 61340-5-1 and 61340-5-2.

Port locations

Available port locations for 6600 series microphone are: 12h, 12n, 12u

Curves

Currently there are two different response curves available; the standard curve and the damped peak response curve.



Response curve of the 6600 series microphone is measured at 0.9V.

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8000 Series Omni Directional Microphone

The 8000 series microphone has a spout less sound inlet.

Sensitivity

There are two sensitivity levels -33.5dB for hearing instruments and -45dB for audio applications.

Low frequency roll off.

The low frequency roll off is determined by the diameter of the pressure equalization hole in the diaphragm.

Signal level at the peak frequency

The damping screen in the sound inlet determines the signal level at the peak frequency. The transmission of the screen determines the damping: The lower the transmission the higher the damping. The transmission of the screen is noted in percentages.

Response curve	Damping screen
Undamped	30%
Standard	15%
Damped peak	8%

Circuitry

The used electronic circuit consists of a P-channel MOSFET together with EMI noise blocking capacitors.



Noise

The diameter of the pressure equalization hole influences the noise level. A larger equalization hole will increase the noise level.

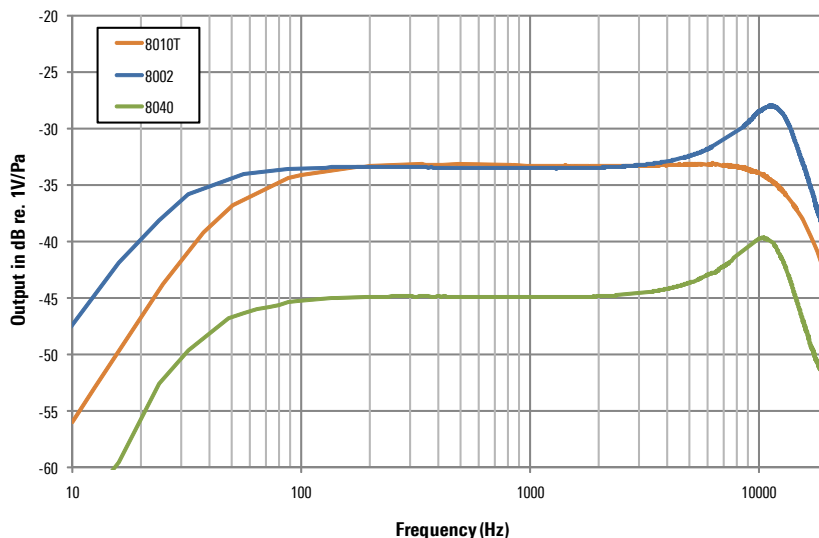
Circuit Parameter	Value @ 0.9V
Output impedance	4.5kΩ typ.
Drain current	17μA typ.
Eq. EMI noise @ 0.9GHz*	30dB SPL max.
Eq. EMI noise @ 1.9GHz*	30dB SPL max.
PSR	14dB
ESD protection level**	Class 3

* According SMI 255.

** ESD protection level according to MIL-STD-750D, test method 1020.2. Apply protection in accordance with IEC 61340-5-1 and 61340-5-2.

Curves

Currently there are two different response curves available; the standard curve and the damped peak response curve.



Response curves of the 8000 series microphone are measured at 0.9V.

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9000 Series Omni Directional Microphone

Low frequency roll off.

The low frequency roll off is determined by the diameter of the pressure equalization hole in the diaphragm:

Response curve	Hole Diameter
Low frequency type 2	20µm
Low frequency type 1	29µm
Standard	49µm
6 dB ski slope	90µm
12 dB ski slope	Modified diaphragm Suspension

For the 96xx/5 and 97xx/5 series the low frequency roll off is determined by the active filtering of the electronic circuit. This electronic filtering minimizes the pressure equalization hole in the diaphragm as a result the deviation in the frequency is very small.

Signal level at the peak frequency

The damping screen in the sound inlet or the internal modification of the microphone determines the signal level at the peak frequency.

The transmission of the screen determines the damping: The lower the transmission the higher the damping. The transmission of the screen is noted in percentages.

Response curve	Damping screen
Undamped	No damping screen
Standard	25%
Damped peak	11% (sound inlet diameter of 1.40mm/.055in)
Damped peak	8% (sound inlet diameter of 1.00mm/.039in)



Noise

The diameter of the pressure equalization hole influences the noise level. Larger equalization hole will increase the noise level. The 96xx/5 and 97xx/5 series microphones have an active filtering stage on board the chip, therefore the pressure equalization hole can be very small and noise is reduced by 1dB.

Circuit Parameter	Value @ 0.9V
Output impedance	4.5kΩ typ.
Drain current	21µA typ.
Eq. EMI noise @ 0.9GHz*	30dB SPL max.
Eq. EMI noise @ 1.9GHz*	30dB SPL max.
PSR	16dB
ESD protection level**	Class 3

* According SMI 255.

** ESD protection level according to MIL-STD-750D, test method 1020.2. Apply protection in accordance with IEC 61340-5-1 and 61340-5-2.

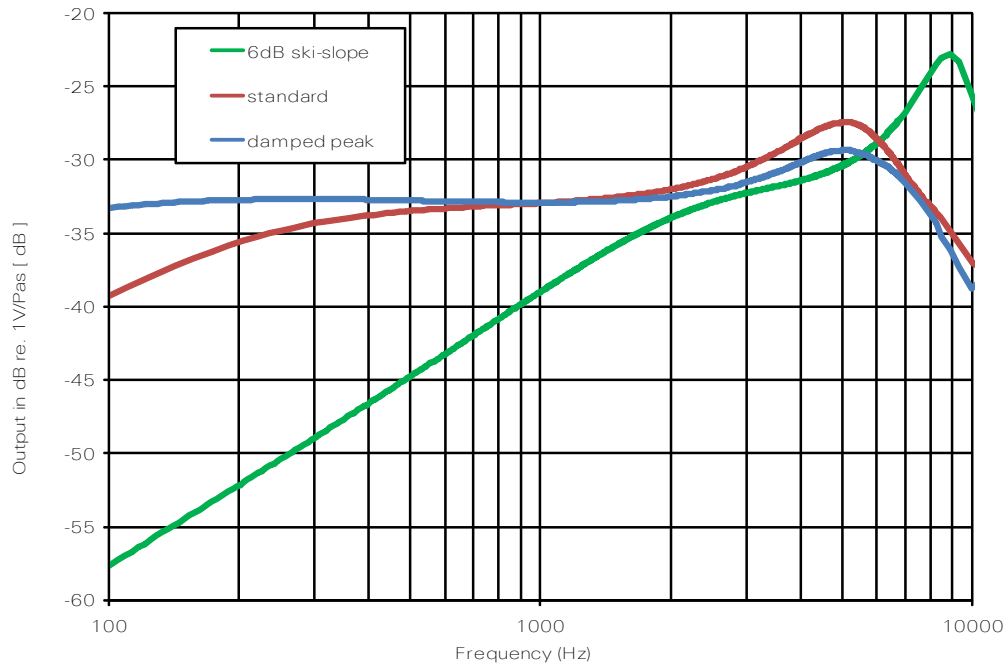
Sensitivity level

There are two types of circuits available resulting in two sensitivity levels: -33dB or -36dB.

Port locations

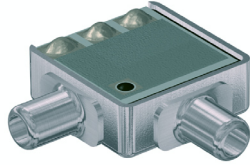
Available port locations for 9000 series microphone are: 12s, 12n, 3s, 3n, 3Kp

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Response curves of the 9000 series microphone are measured at 1.3V.

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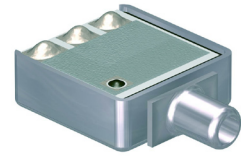
Directional Microphones

Models

All microphones described in this article are also available as a directional microphone with a variety of sound inlet positions for the front and rear ports.

The selection is extensive so please contact customer service for a specific directional microphone best-suited to your application.

The 6000 series microphone is an exceptional directional microphone because of its excellent Directionality Index performance in a very small package like for example the 6001, 6003, 6008 and 6950 microphones.



Matched Pair Microphones

Models

All series microphones are also available as a matched pair. For best results in Directionality Index we advise to use a microphone model with a small air pressure equalization hole.

The microphone models with the special active filtering stage are the best choice due to the extreme constant phase response.

For product variations other than described in this application note please refer to the customer service department for further assistance.