

SEIT 1928

KONDENSATORMIKROFONE  
FÜR STUDIO-UND MESSTECHNIK

**MICROTECH GEFELL**



# KEM 970

## CARDIOID PLANE MICROPHONE

The first microphone of its kind with non-rational symmetry

- multi-capsule condenser microphone system
- broad cardioid pattern to cover wide or moving sound sources
- locate up to three times the distance of omni microphones for same diffuse field
- optimum positioning using visual indicators
- Suppression of undesirable reflections on the vertical axis
- 6 dB improvement in feedback threshold for sound reinforcement applications
- frequency response 40 - 18000 Hz
- line level output, two position pre-attenuation switch
- high pass filter switch
- analog or digital AES/EBU-DPP outputs



Thüringer Preis für Produktdesign 1999



bundespreis  
produkt  
design  
2000/2001



## DESCRIPTION OF PRODUCT

The Cardioid Plane Microphone is a multi-capsule microphone system with unique directional characteristics that are largely independent of frequency. On the horizontal axis the KEM 970 has the characteristic of a cardioid microphone, whilst on the vertical axis the characteristics resemble a shotgun microphone with a very narrow acceptance angle of about 30°. The directional pattern is therefore particularly well suited to the most frequently encountered situations where the source to be recorded is widely spread, or moving across the horizontal plane, and sound arriving from other directions needs to be attenuated.

Attenuated sound may consist of unwanted noise or reflections from surfaces such as ceilings, tables or the floor. Mounting the microphone physically on its side can significantly reduce feedback problems from sound reinforcement loudspeaker installations on the side walls.

For effective use of the highly directional nature of this microphone, a good understanding of the directions from which wanted and unwanted sounds arrive is important. The more care taken in positioning the KEM 970, the better the results obtained will be. Integrated front facing indicator lights help in positioning the microphone accurately.

Acoustic treatment to improve a room can be an extremely costly exercise, and perhaps not even possible when trying to achieve the average 5 dB increase in operating level that the KEM 970 provides. An added benefit of the KEM 970, as shown in Fig.3, is its ability through skilled use of the sensitivity characteristics, to compensate for level changes if the sound source moves closer to the microphone.

Recommended applications for the KEM 970:

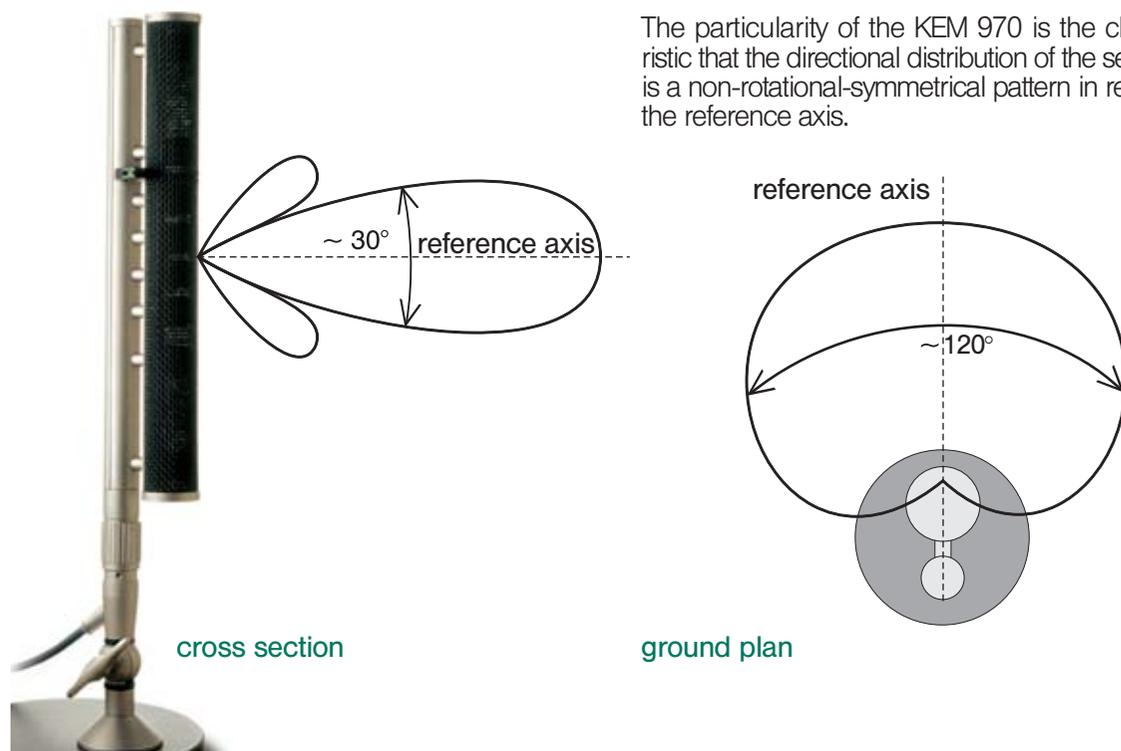
- on edges, or ends of a stage
- at a presenter's desk
- as a table microphone
- radio and TV productions
- video conferencing
- location of neighbouring unwanted noise

Initial experience gained from practical applications in TV production, stage-sound reinforcement and presenter amplification at lecterns, confirms the fundamental theoretical benefits of the Cardioid Plane Microphone across a wide range of varied applications.

The KEM 970 was developed in cooperation with the Institut für Rundfunktechnik (IRT) in Munich.



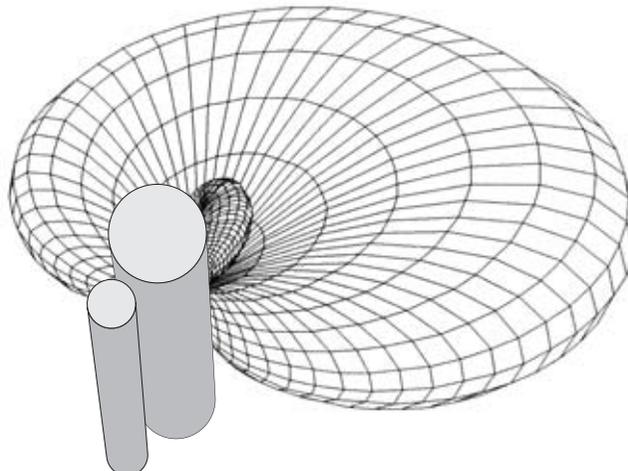
## APPLICATIONS OF THE CARDIOID PLANE MICROPHONE



**Fig. 1** Presentation of the direction of the maximum sensitivity together with the reference axis

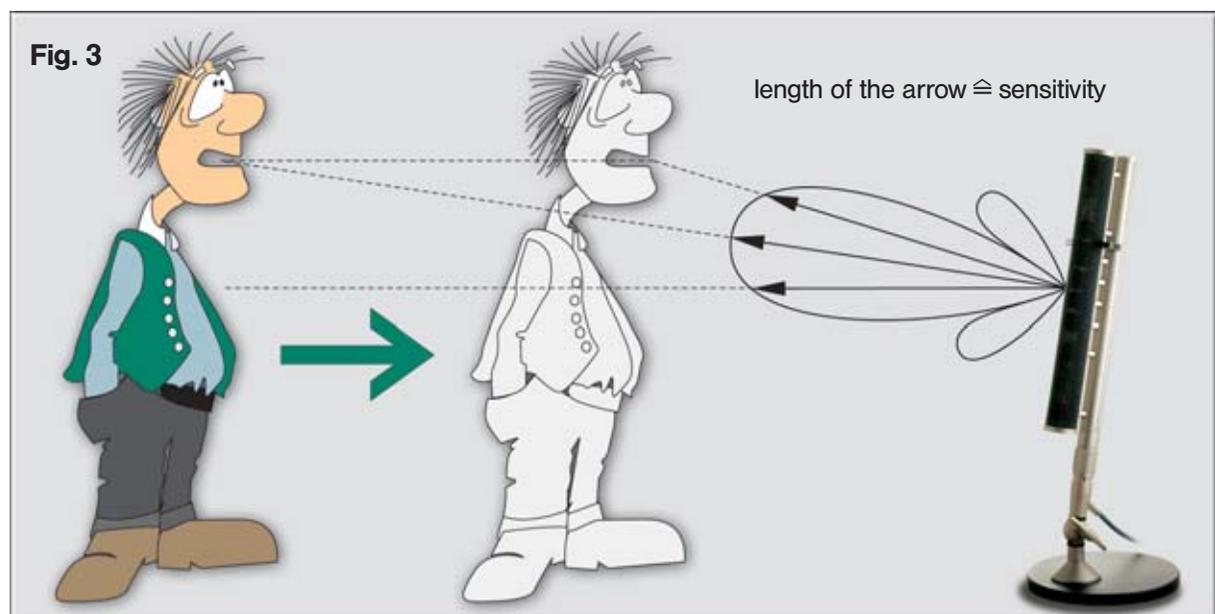
Cardioid Plane Microphone is a name that describes the unique directional pattern of the KEM 970 (a disc-shaped cardioid directional response). The KEM 970 response pattern exhibits the properties of:

- a microphone with a super cardioid characteristic on the horizontal axis.
- the polar response of a highly directional microphone in the vertical plane.



**Fig. 2 Directional distribution pattern of sensitivity**

An added benefit of the KEM 970, as shown in Fig.3 is its ability through skilled use of its sensitivity characteristics, to compensate for level changes when the sound source moves closer to the microphone.

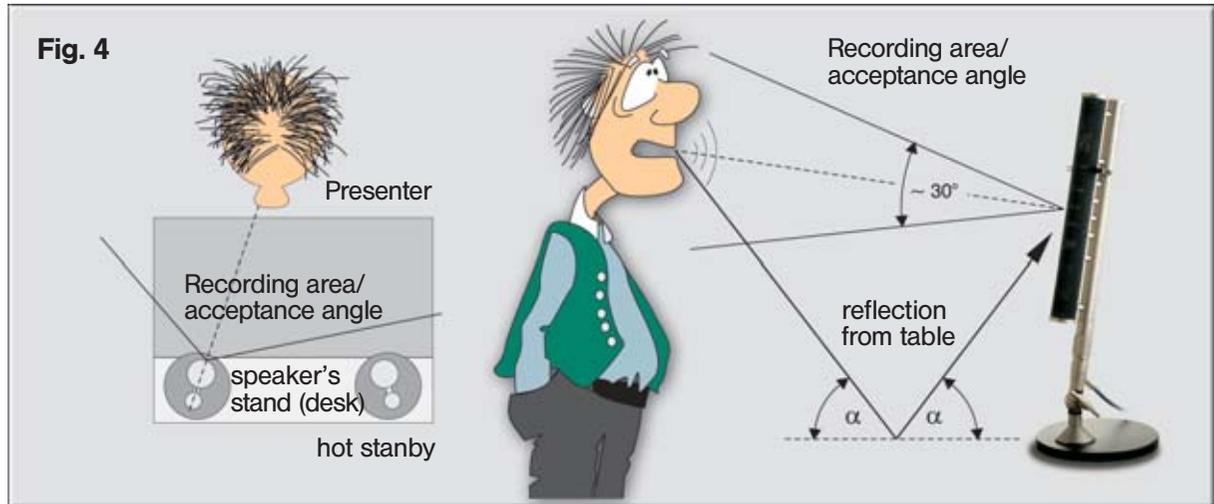


The sound source, (the presenter in the illustration) initially starts to speak on the line of maximum sensitivity. If he approaches closer to the microphone he will deviate vertically from the line of maximum sensitivity. This change will compensate for the increase in sound level that arises from closer proximity to the microphone. By choosing different angles of inclination, the degree of the compensation can be varied.

Some applications in which the special features of the KEM 970 can be of particular advantage are briefly described in the following examples:

## 1. APPLICATION AS A TABLE MICROPHONE

Table mounting the KEM 970 as in Fig. 4 allows microphone the to reject unwanted noise or reflections generated by the table surface.



Comb filter effects generated by table reflections, or paper rustling noises from the desk, etc. are all attenuated significantly. Also apparent from Fig. 4, is the microphones' immunity to sound from overhead or ceiling mounted sound reinforcement loudspeakers in the vicinity of the presenter. This significantly raises the threshold of feedback, providing much greater resistance to howl-round.

## 2. APPLICATION AT THE SPEAKERS STAND (DESK)

With the KEM 970 positioned as shown in Fig. 4, the presenter has much greater distance and lateral freedom of movement, without the normally attendant quality problems that could be expected with conventional microphones.



KEM 970  
Cardioid Plane Microphone  
"Reichstagsgebäude Berlin"

## KEM 970 Cardioid Plane Microphone



Dalai Lama, Mailand 1999

shareholders' meeting of Siemens in 2003

application at the parliament of Thuringia

Animated speakers are therefore unlikely to move outside the coverage area of the KEM 970. The low sensitivity of the microphone to off-axis disturbances, such as rustling of manuscripts on the desk, or reflections from the surface is a welcome advantage. Sensitivity to adverse influences from overhead sound reinforcement installations is effectively reduced compared with conventional microphones.

As an emergency backup, a second KEM 970 can be mounted on the other side of the desk. When two microphones are mounted symmetrically on either side of the desk, the view of the speaker from the auditorium or a camera is not impaired. By contrast, the conventional arrangement of multiple microphones often compromises the view considerably.

KEM 970



KEM 970



application for interactive video conferences , live conferences

## 3. APPLICATION ON THE STAGE

As an example application, one or more KEM 970 microphones can be placed on floor stands near the edge of the stage, directed towards the area occupied by the actors.

If the configuration shown in Fig. 3 is used, then undesirable noise emanating from the stage floor is considerably reduced.

If a sound reinforcement system is in use, the highly directional sensitivity of the KEM 970 on a single axis also adds increased immunity to feedback when compared to other commonly used microphones.

It is easy to imagine a numerous other applications for the KEM 970, such as creating acoustic effects in radio drama production. Different acoustic scenes can be simulated by an actor changing position around the areas of varying sensitivity to influence the ratio of direct to diffuse sound.

### KEM 970 Cardioid Plane Microphone



application at the "Konzerthaus Berlin"

recording the choir at the "Thomaskirche zu Leipzig"

## DELIVERY

Cardioid Plane Microphone KEM 970, Suitcase 2 - Aluminium L x B x H 450 x 160 x 365 mm

Power supply N 970 or

Power supply N 970 D, optional: output digital - AES/EBU - DPP

Microphone cable C 97 S with swivel mount

satin nickel

Order-No. 211149

dark bronze

Order-No. 211159

# KEM 970

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## TECHNICAL DATA

CE Certificate

**Cardioid Plane Microphone KEM 970**, with non-rotational-symmetrical directivity

Polar pattern	horizontal	super cardioid
	vertical	club shaped
recording angle	horizontal	120°
	vertical	30°
Acoustic operating principle		Pressure gradient transducer
Frequency range		40 - 18000 Hz
Sensitivity		775 mV/Pa
at 1 kHz ( switch position "line")		
Switch position "reduced bass roll-off" at 90 Hz		-10 dB
Rated impedance		40 Ω
Equivalent loudness level	CCIR 468-4	24 dB
due to inherent noise	DIN EN 60 651	15 dB A
Signal-to-noise ratio	CCIR-weighted	70 dB
(re 1 Pa at 1 kHz)	A-weighted	79 dB
Max. SPL for THD 0,5%	switch position "line"	116 dB
	-10 dB	126 dB
	-20 dB	136 dB
Output connector		7-pin Tüchel built-in flange plug, goldplated contacts
Finish		satın nickel, dark bronze

### Power supply N 970/N 970 D

Power supply voltage	230/115 V AC ± 10% 50/60 Hz
Output connector	Tüchel built-in flange box T 3463.000 XLR built-in flange plug SWC D3M

### Dimensions/Weight

Microphone (L x Ø)	355 x 40/25 mm / 0,96 kg
Power supply unit N 970 / N 970 D	190 x 127 x 90 mm / 1,8 kg
Connecting cable C 97 S with swivel mount	10 m / 1,1 kg

## ACCESSORIES, optional

Windscreen, anthracite, two parts	W 97	Order-No. 202411
Microphone holder for stationary fixing satin nickel	MH 97 )*	Order-No. 202333
dark bronze		Order-No. 202334
Microphone holder for elastic-stationary fixing M 10 satin nickel	MH 97.1	Order-No. 202335
dark bronze		Order-No. 202336
Auditorium hanger, black	MA 97	Order-No. 202348
Auditorium hanger satin nickel	MA 97.1	Order-No. 202347
dark bronze		Order-No. 202346
Connection cable, Tuchel 7-pin, 10 m	C 97.1	Order-No. 202207
Connection cable, Tuchel 7-pin, 20 m	C 97.2	Order-No. 202208
Connection cable, Tuchel 7-pin, 30 m	C 97.3	Order-No. 202209
Connection cable with swivel mount, Tuchel 7-pin, 10 m	C 97 S )*	Order-No. 202205

\*) tripod-thread: 3/8", 1/2", 5/8"

Windscreen W 97



Connection cable with swivel mount C 97 S



Microphone holder MH 97.1  
elastic-stationary



Microphone holder MH 97



Auditorium hanger MA 97



Auditorium hanger MA 97.1

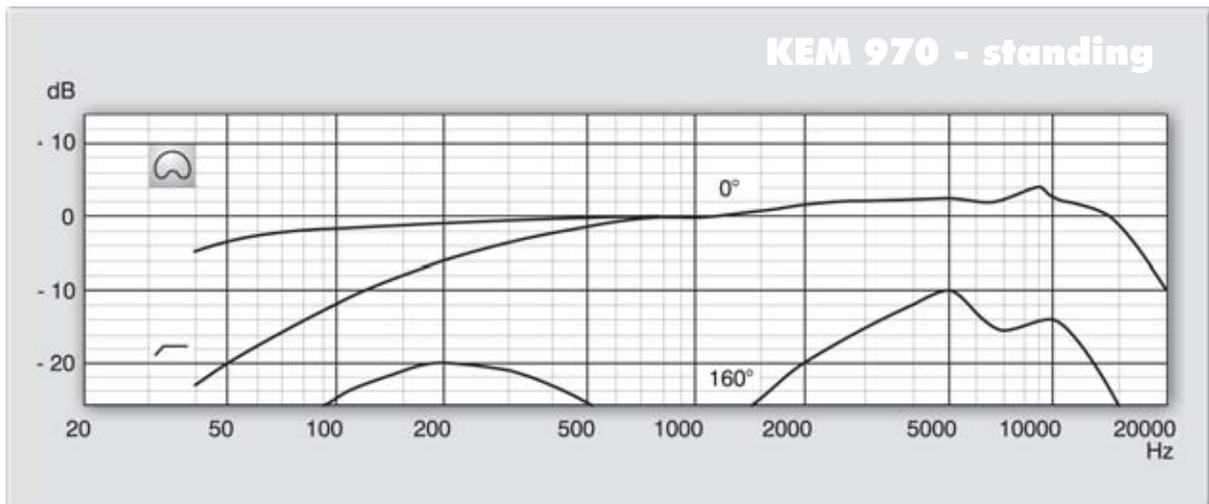


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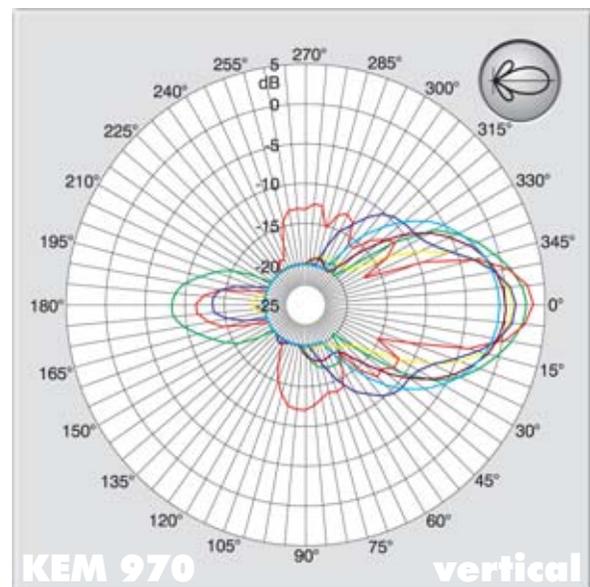
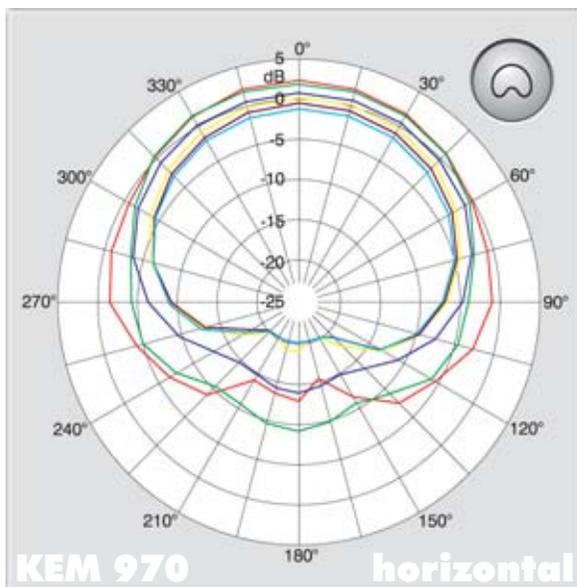
## MADE TO SPECIFICATION



## FREQUENCY RESPONSE



## POLAR PATTERNS



8 kHz 5 kHz 3,15 kHz 2 kHz 1,25 kHz 800 Hz