

# Field Effect Transistor Condenser Studio Microphone in CMS<sup>®</sup>



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# Capsules

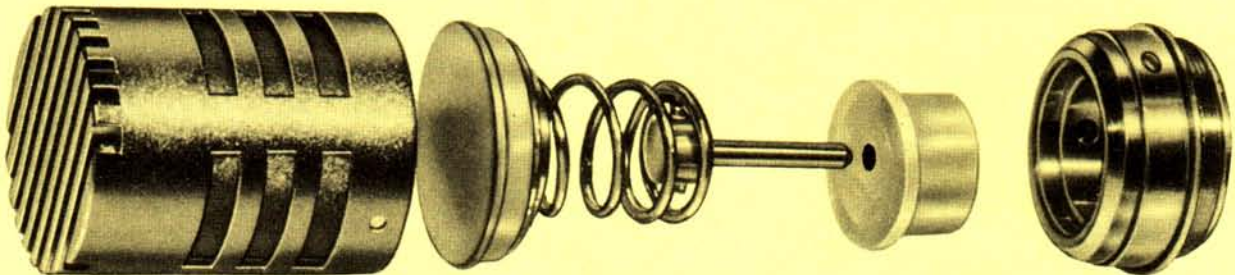
AKG's condenser microphone capsules have always been known not only for their very high acoustic properties but also for the high precision of their manufacture – a result of great technical effort.

AKG set itself the task of developing a transducer element for the C $\overline{\text{M}}$ S system which would offer essential technical improvements to be used in all C $\overline{\text{M}}$ S capsules:

- a) meeting of the objectivity requirement:  
which means smooth and even frequency response as well as directional characteristics which are independent of frequency;
- b) high temperature stability and resistance to aging as well as insensitivity to moisture;
- c) simple mechanical construction.

The result:

**a stable condenser transducer**





The transducer consists of a gold-coated ceramic electrode and a specially embossed diaphragm. As the result, the fundamental resonance of the highly stable diaphragm may be placed at about 1300 Hz, the optimum value for wideband electrostatic pressure-gradient microphones. In addition, frequency response at high frequencies can be perfectly controlled in combination with a new acoustic delay line. The acoustic **delay line** (Fig. 2) accounts for the good directional characteristics at high frequencies. It consists — in conformity with the first mechanic-electric analogy — of two RC members, whereby one C functions also as an acoustic delay line at high frequencies.

The adjustment for maximal extinction results by variation of the condenser C 3, which corresponds to the volume between diaphragm and acoustical frictional resistance.

### The Ceramic Back-Plate (Counter-electrode)

is gold-coated in high vacuum, whereby the gold layer reaches from the electrode surface to the back of the electrode by way of holes. The contact is accomplished by means of a gold-coated contact ring. The diaphragm is affixed with adjustable pre-stressing, whereby the contact from the diaphragm goes directly over the capsule housing.

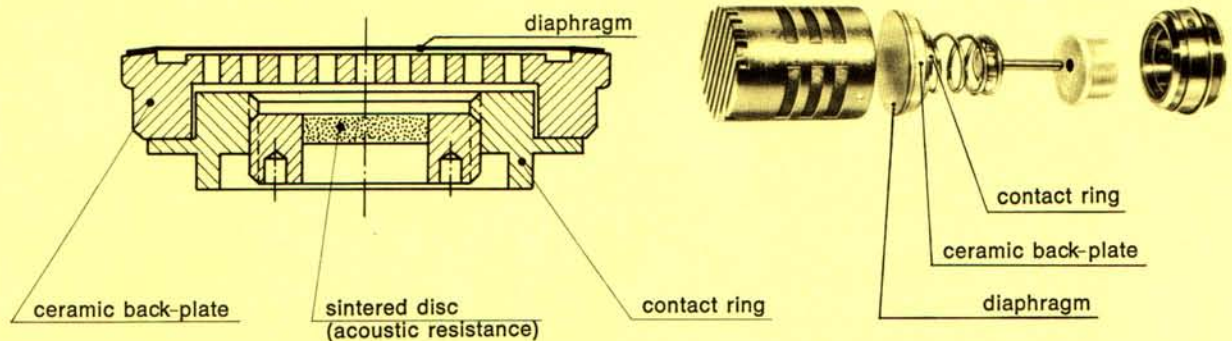
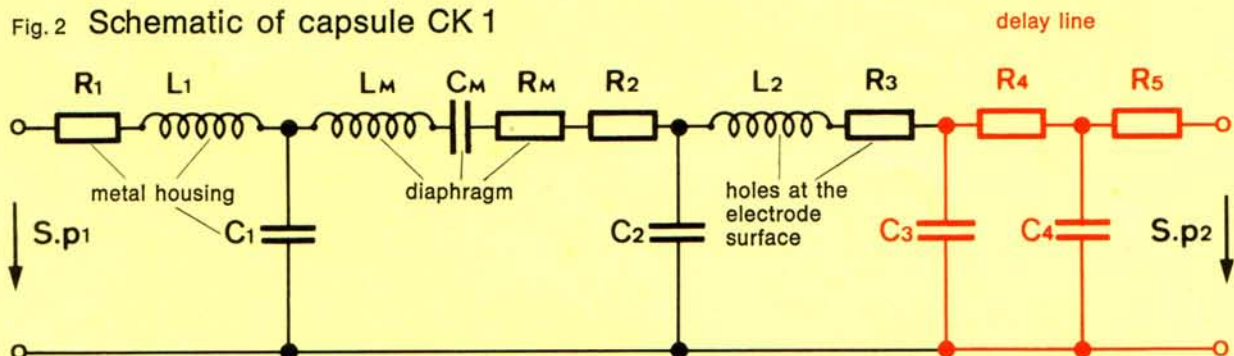


Fig. 1 Ceramic Back-Plate

Fig. 2 Schematic of capsule CK 1



The ceramic electrode is designed in such a way, as to provide it with especially long insulating distances.

Therefore the capsule can be used under unfavorable climatic conditions and also at very close talking. Severe temperature and aging tests ( $-20^{\circ}\text{C}$  to  $+100^{\circ}\text{C}$  /  $-4^{\circ}\text{F}$  to  $+212^{\circ}\text{F}$ ) did not show any changes in acoustic or electric properties (see diagrams A–D, on next page).

### The Diaphragm

Through further development the embossed pattern can be transferred also to the plastic diaphragm.

However it was necessary to enlarge the trough pattern to balance the different temperature coefficients of the ceramic material and the plastic foil.

Varying the depth, width and height of troughs (embossed pattern, Fig. 3) or their number per surface unit and relative position to each other, almost any desired elasticity can be obtained with all stress zones disappearing and improving the evenness of the diaphragm surface, within certain limits.

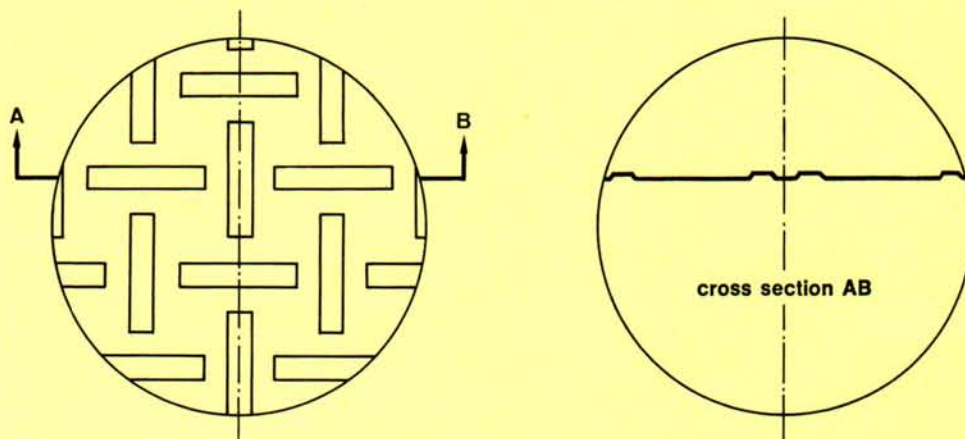


Fig. 3 Circular diaphragm with embossed trough pattern  $M = 100 : 1$

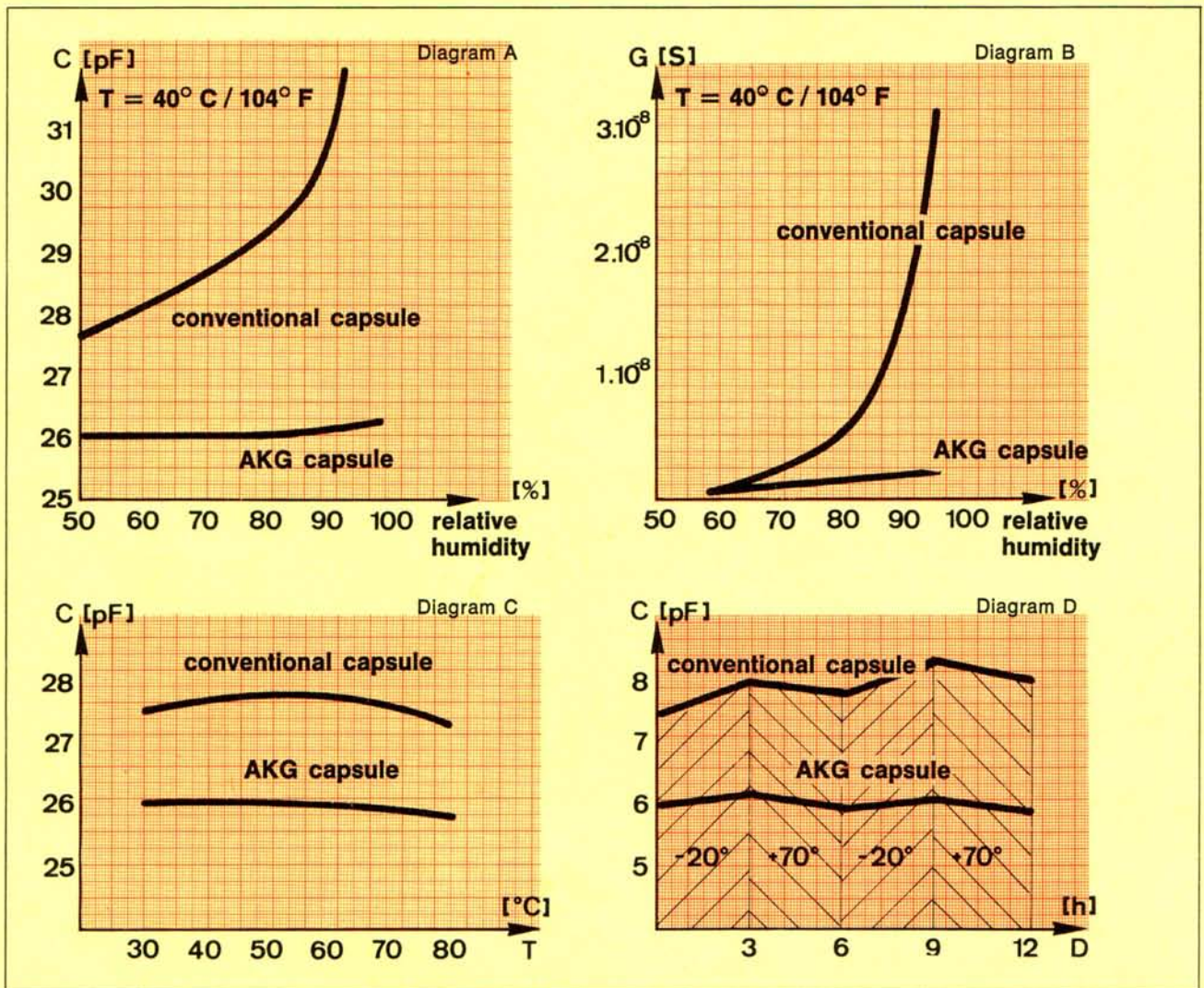


The diagrams A and B show the moisture behaviour as function of the capacitance (C) or the conductance (G). In the case of condenser capsules of conventional design the application limit is at an ambient temperature of 40° C / 104° F and 85% relative humidity, while the AKG condenser capsules are still functioning perfectly at 99%, provided that no condensation occurs.

The diagram C shows the influence of temperature for both capsules: the capsules of conventional design show a greatly different temperature characteristic, mostly subject to hysteresis.

Diagram D shows the behavior of the capsules during artificial aging. An alternating temperature sequence of — 20° C / — 4° F and + 70° C / + 158° F, every three hours, was selected. A change of the capacitance was observed each time the room temperature was being reached. This change is insignificant in the case of the AKG stable capsule, but very large in the case of capsules of conventional design.

**This technique is being used in all AKG condenser capsules.**





**Stable AKG condenser capsule:**

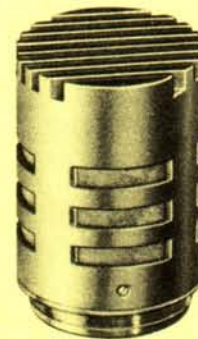
**Integrated ceramic electrode, highly stable, aging-resistant diaphragm**

**Smooth frequency response within the entire transmission range between 20 ... 20 000 Hz**

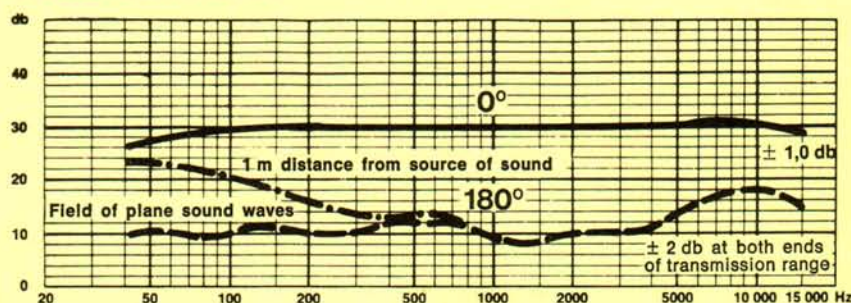
**Directional characteristic: frequency-independent cardioid, with uniform front-to-back discrimination**

**180° discrimination > 20 db**

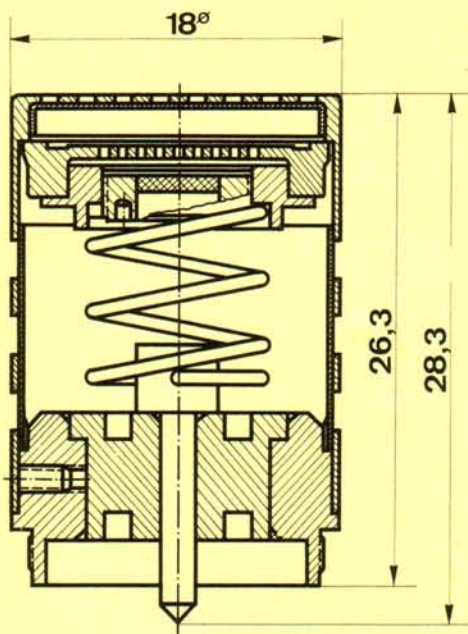
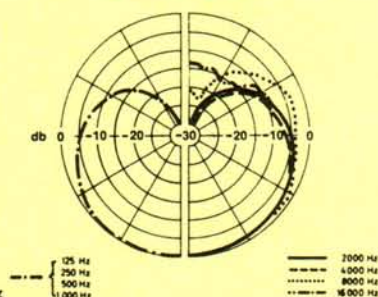
**Functions up to 99% relative humidity**



Frequency response curve



Polar diagram



## Technical Data:

Type: Pressure gradient receiver  
 Frequency Range: 20 ... 20 000 Hz  
 Directional Characteristic: frequency-independent cardioid  
 Sensitivity at 1000 Hz: 0.95 mV/μbar  $\approx$  9.5 mV/Pa  
 Unweighted Noise Level: 3.6 μVeff  
 Weighted Noise Level: 2.2 μVeff  
 Equivalent Noise Level: 21 db } Filter CCITT-C/DIN 45 405  
 Capsule Capacity: 27 pF  
 Weight: 20 g.; gross weight: 60 g.  
 Temperature Range: -20° C ... +60° C  
 Humidity: at 20° C ... 99%, at 60° C ... 95%

## MEASURING TECHNIQUE:

The capsule has been measured with an AKG standard measuring preamplifier with following technical data:  
 No-load Amplification: 0.47  
 Input Capacitance: 12 pF  
 Polarisation Voltage: 62 V

**Stable AKG condenser capsule:**  
Integrated ceramic electrode, highly stable, aging-resistant diaphragm

**Wide transmission range of 20 ... 20 000 Hz with presence rise for added brilliance**

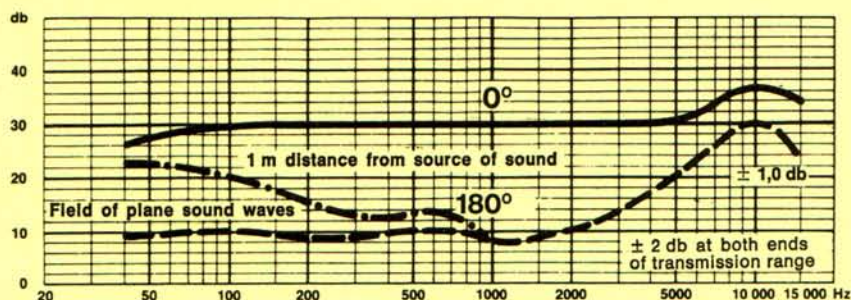
**Directional characteristic: frequency-independent cardioid, with uniform front-to-back discrimination**

**180° discrimination > 20 db**

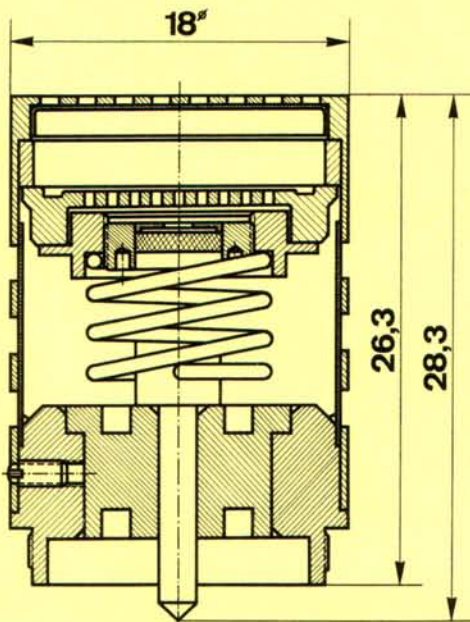
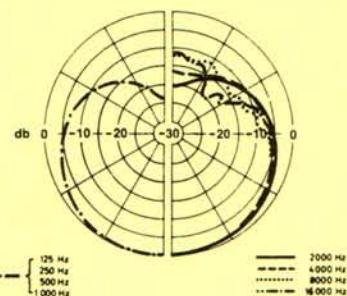
**Functions up to 99% relative humidity**



Frequency response curve



Polar diagram



## Technical Data:

Type: Pressure gradient receiver  
Frequency Range: 20 ... 20 000 Hz  
Directional Characteristic: frequency-independent cardioid  
Sensitivity at 1000 Hz: 0.95 mV/μbar  $\approx$  9.5 mV/Pa  
Unweighted Noise Level: 3.6 μVeff  
Weighted Noise Level: 2.2 μVeff } Filter CCITT-C/DIN 45 405  
Equivalent Noise Level: 21 db  
Capsule Capacity: 27 pF  
Weight: 20 g.; gross weight: 60 g.  
Temperature Range: -20° C ... + 60° C  
Humidity: at 20° C ... 99%, at 60° C ... 95%  
MEASURING TECHNIQUE:  
The capsule has been measured with an AKG standard measuring preamplifier with following technical data:  
No-load Amplification: 0.47  
Input Capacitance: 12 pF  
Polarisation Voltage: 62 v



# CK 5

**Stable AKG condenser capsule:**  
Integrated ceramic electrode, highly stable, aging-resistant diaphragm

**Wide transmission range from 20 ... 20 000 Hz**

**Directional characteristic: frequency-independent cardioid, with uniform front-to-back discrimination**

**180° discrimination > 20 db**

**Internally suspended system**

**Frequency response is compensated for proximity effect characteristics**

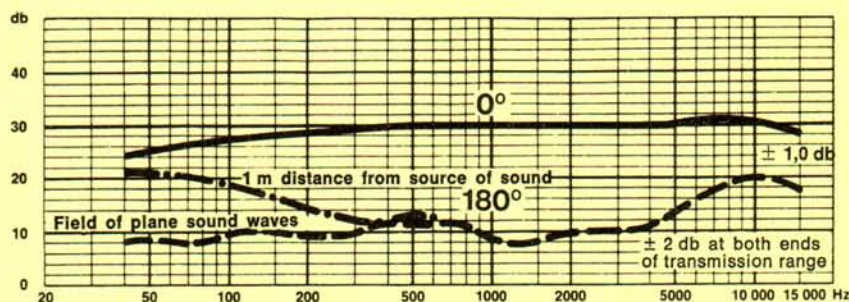
**Ideal as soloist microphone:**  
insensitive to mechanical shock and handling noise

**Built-in wind- and pop-screen**

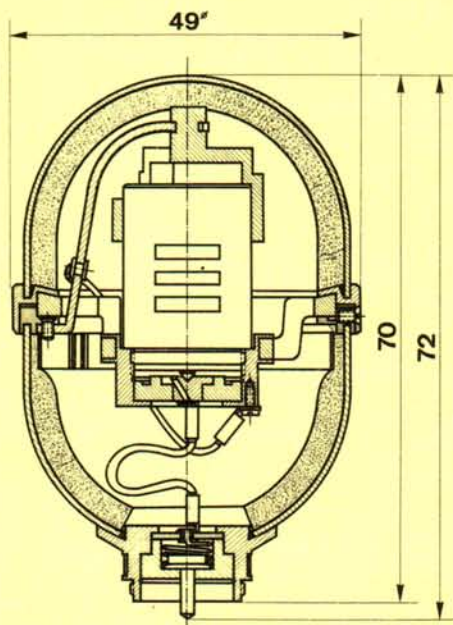
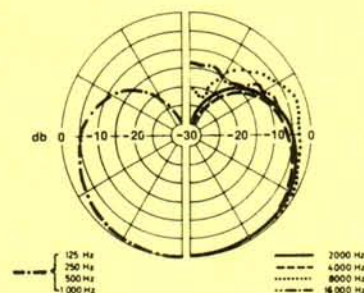
**Functions up to 99% relative humidity**



Frequency response curve



Polar diagram



## Technical Data:

Type: Pressure gradient receiver  
Frequency Range: 20 ... 20 000 Hz  
Directional Characteristic: frequency independent cardioid  
Sensitivity at 1000 Hz: 0.95 mV/μbar  $\approx$  9.5 mV/Pa  
Unweighted Noise Level: 3.6 μveff  
Weighted Noise Level: 2.3 μveff  
Equivalent Noise Level: 22 db } Filter CCITT-C/DIN 45 405  
Capsule Capacity: 27 pF  
Weight: 100 g.; gross weight: 200 g  
Temperature Range: -20° C ... +60° C  
Humidity: at 20° C ... 99%, at 60° C ... 95%

## MEASURING TECHNIQUE:

The capsule has been measured with an AKG standard measuring preamplifier with following technical data:  
No-load Amplification: 0.47  
Input Capacitance: 12 pF  
Polarisation Voltage: 62 v



# CK 8

**Stable condenser capsule with interference tube:  
Integrated ceramic electrode, highly stable, aging-resistant  
diaphragm**

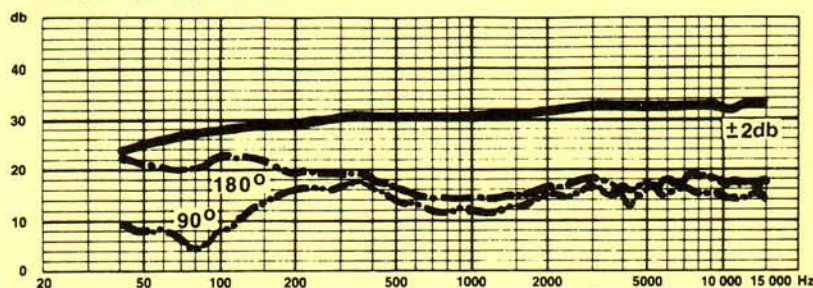
**Smooth frequency characteristic from 30 ... 20 000 Hz  
The combination of the gradient and the interference principle  
results in a frequency-independent directional characteristic**

**Narrow pick-up pattern and medium distance "reach"  
(in comparison with CK 1) account for clear emphasis of the  
desired sound sources. For extreme directive effects we  
suggest the use of the CK 9 or the extension tube VR 2 with a  
CK 1S capsule**

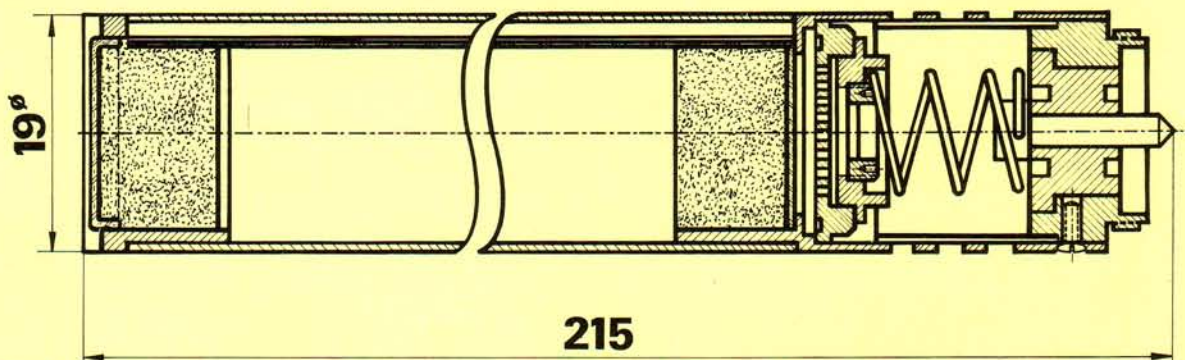
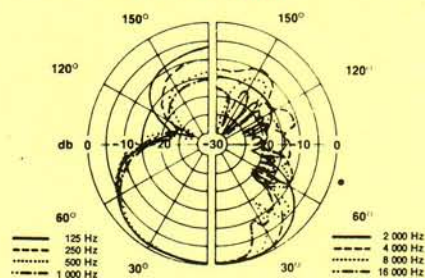
**Functions up to 99% relative humidity**



Frequency response curve



Polar diagram



## Standard accessories:

Windscreen W 18

## MEASURING TECHNIQUE:

The capsule has been measured with an AKG standard measuring preamplifier with following technical data:  
No-load Amplification: 0.47  
Input Capacitance: 12 pF  
Polarisation Voltage: 62 V  
Source Impedance: 120 ohms

## Technical Data:

Type: Combination of gradient and interference receiver  
Frequency Range: 30 ... 20 000 Hz  
Directional Characteristic: front only  $\pm 45^\circ$   
Sensitivity at 1000 Hz: 1.5 mV/ $\mu$ bar  $\approx$  15 mV/Pa  
Unweighted Noise Level: 3.6  $\mu$ Veff  
Weighted Noise Level: 2.2  $\mu$ Veff } Filter CCITT-C/DIN 45 405  
Equivalent Noise Level: 18 dB  
Capsule Capacity: 27 pF  
Weight: 75 g.; gross weight: 330 g.  
Temperature Range:  $-20^\circ\text{C}$  ...  $+60^\circ\text{C}$   
Humidity: at  $20^\circ\text{C}$  ... 99%, at  $60^\circ\text{C}$  ... 95%



**Stable condenser capsule with interference tube:  
Integrated ceramic electrode, highly stable, aging-resistant diaphragm**

**Smooth frequency characteristic from 30 . . . 18 000 Hz**

**By combining the gradient and the interference principle a frequency-independent directional characteristic results in**

**High directional accuracy**

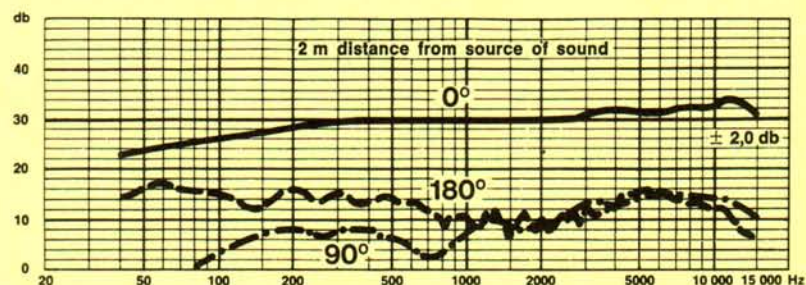
**Clear emphasis of the desired sound sources**

**Undesired extraneous noise is effectively suppressed**

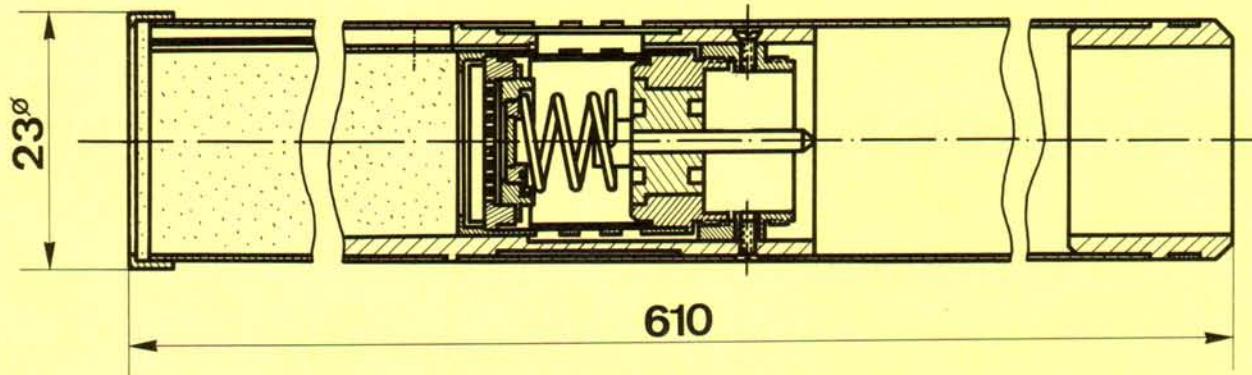
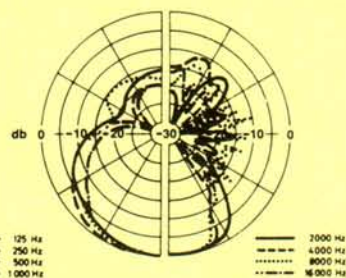
**The high concentration permits a greater working distance from the microphone**

**Functions up to 99% relative humidity**

Frequency response curve



Polar diagram



## Technical Data:

Type: Combination of gradient and interference receiver  
Frequency Range: 30 . . . 18 000 Hz  
Directional Characteristic: front only  $\pm 30^\circ$   
Sensitivity at 1000 Hz: 1.1 mV/ $\mu$ bar  $\approx$  11 mV/Pa  
Unweighted Noise Level: 3.6  $\mu$ veff  
Weighted Noise Level: 2.2  $\mu$ veff  
Equivalent Noise Level: 21 db } Filter CCITT-C/DIN 45 405  
Capsule Capacity: 27 pF  
Weight: 480 g.; gross weight: 950 g.  
Temperature Range:  $-20^\circ\text{C}$  . . .  $+60^\circ\text{C}$   
Humidity: at  $20^\circ\text{C}$  . . . 99%, at  $60^\circ\text{C}$  . . . 95%

## MEASURING TECHNIQUE:

The capsule has been measured with an AKG standard measuring preamplifier with following technical data:  
No-load Amplification: 0.47  
Input Capacitance: 12 pF  
Polarisation Voltage: 62 v



# C 451C/C 451E

Condenser microphone preamplifier in semiconductor technique

Field effect transistor (FET)

Extended long-time stability

Minimum noise

High operating reliability

Functions up to 99% relative humidity

Low power consumption

For standard phantom circuit with any operating voltage from 9 to 52 v

Available in two versions:

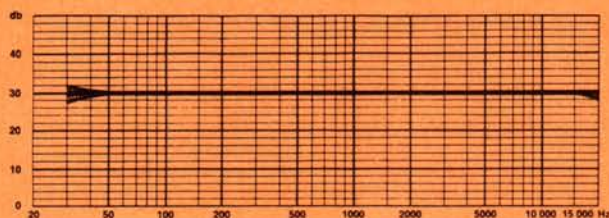
C 451C: for three-pin standard plug according to DIN 41 524

C 451E: for three-pin Cannon plug XLR-3-11C or equivalent

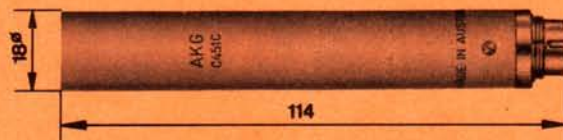
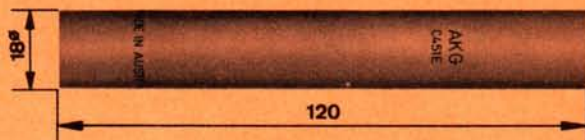
## Technical Data:

Type: FET preamplifier  
Frequency Range: 5 ... 30 000 Hz  
No-load Amplification:  $0.47 \pm 0.5$  db  
Source Impedance (20 ... 20 000 Hz):  $\leq 200$  ohms  
Supply Voltage: 9 to 52 v (d.c.). Sensitivity is proportionally reduced within the range of 7.5 to 9 v  
Current Consumption:  $\leq 5.5$  ma (DIN 45 596)  
Unweighted Noise Level:  $3.6 \mu\text{veff}$   
Weighted Noise Level:  $2.2 \mu\text{veff}$ , max.  $2.8 \mu\text{veff}$   
Equivalent Noise Level: 21 db } Filter CCITT-C/DIN 45 405  
(sensitivity  $0.95 \text{ mv}/\mu\text{bar}$ )  
Sensitivity to Magnetic Stray Field:  
at 50 Hz:  $5 \mu\text{v}/50 \text{ mgauss}$   
at 100 Hz:  $8 \mu\text{v}/50 \text{ mgauss}$   
at 1000 Hz:  $80 \mu\text{v}/50 \text{ mgauss}$   
Load Impedance:  $\geq 500$  ohms  
Harmonic Distortion at 1000 Hz (UE = 200 mv):  $\leq 0.5\%$   
Weight: 74 g.; gross weight: 370 g.  
Temperature Range:  $-20^\circ \text{C} \dots +60^\circ \text{C}$   
Humidity: at  $20^\circ \text{C} \dots 99\%$ , at  $60^\circ \text{C} \dots 95\%$

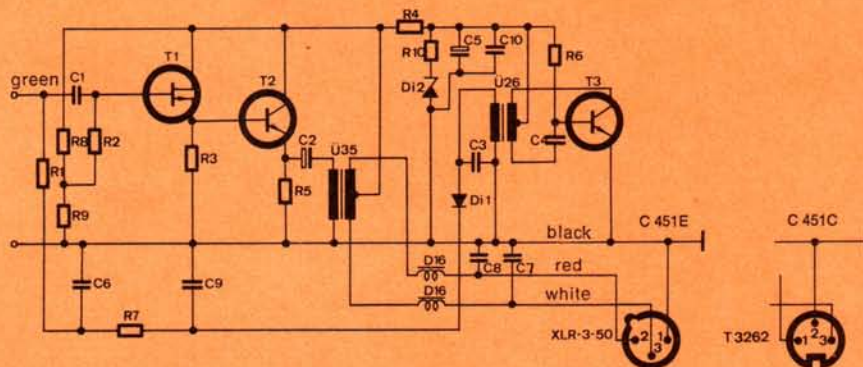
## Frequency response curve:



## Dimensions [mm.]:



## Connection:





# C 451CB/C 451EB

Condenser microphone preamplifier in semiconductor technique (FET) with built-in 2-position bass attenuator 0 db, -7 db at 50 Hz (roll off starts at 75 Hz), -20 db at 50 Hz (roll off starts at 150 Hz)

Field effect transistor (FET)

Minimum noise

Functions up to 99% relative humidity

Extended long-time stability

High operating reliability

Low power consumption

For standard phantom circuit with any operating voltage from 9 to 52 v (d.c.)

Available in two versions:

C 451CB: for three-pin standard plug according to DIN 41 524

C 451EB: for three-pin Cannon plug XLR-3-11C or equivalent



## Technical Data:

Type: FET preamplifier

Frequency Range: 5 ... 30 000 Hz

No-load Amplification:  $0.47 \pm 0.5$  db

Source Impedance (20 ... 20 000 Hz):  $\leq 200$  ohms

Supply Voltage: 9 to 52 v (d.c.), Sensitivity is proportionally

reduced within the range of 7.5 to 9 v

Current Consumption:  $\leq 5.5$  ma (DIN 45 596)

	linear (0 db)	75 Hz, 150 Hz
Unweighted Noise Level ( $\mu$ eff):	3.6	4.5
Weighted Noise Level ( $\mu$ eff) *):	2.2 (max. 2.5)	2.3 (max. 3.1)
Equivalent Noise Level *):	21 db	22 db

\*) Filter CCITT-C/DIN 45 405

Sensitivity to Magnetic Stray Field: at 50 Hz:  $5 \mu$ v/50 mgauss  
at 100 Hz:  $8 \mu$ v/50 mgauss  
at 1000 Hz:  $80 \mu$ v/50 mgauss

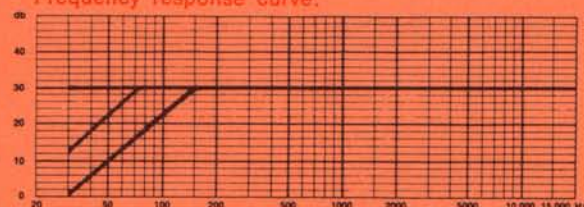
Load Impedance:  $\geq 500$  ohms

Weight: 85 g.; gross weight: 360 g.

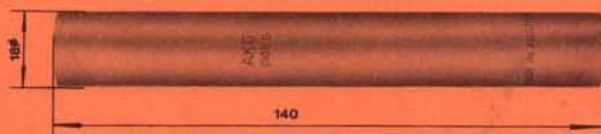
Temperature Range:  $-20^{\circ}$  C ...  $+60^{\circ}$  C

Humidity: at  $20^{\circ}$  C ... 99%, at  $60^{\circ}$  C ... 95%

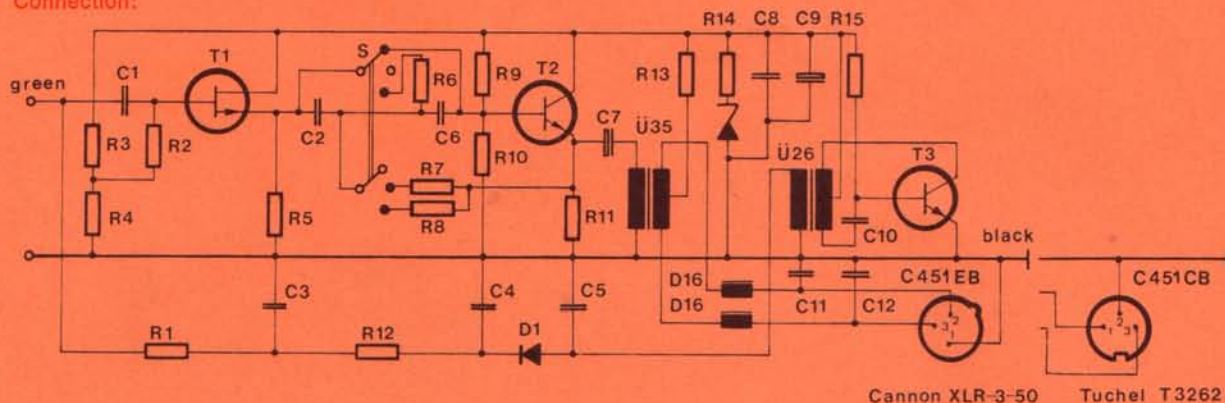
## Frequency response curve:



## Dimensions [mm.]:



## Connection:



Cannon XLR-3-50

Tüchel T 3262



# C 452CB/C 452EB

Condenser microphone preamplifier in semiconductor technique (FET) with built-in 2-position bass attenuator 0 db, -7 db at 50 Hz (roll off starts at 75 Hz), -20 db at 50 Hz (roll off starts at 150 Hz)

Field effect transistor (FET)

Minimum noise

Functions up to 99% relative humidity

Extended long-time stability

High operating reliability

Low power consumption

For phantom circuit with an operating voltage of 48 v only (DIN 45 596)

Available in two versions:

C 452CB: for three-pin standard plug according to DIN 41 524

C 452EB: for three-pin Cannon plug XLR-3-11C or equivalent



## Technical Data:

Type: FET preamplifier

Frequency Range: 5 ... 30 000 Hz

No-load Amplification:  $0.47 \pm 0.5$  db

Source Impedance (20 ... 20 000 Hz):  $\leq 200$  ohms

Supply Voltage: 48 v (+6 v, -8 v)

Current Consumption: approx. 3 ma (DIN 45 596)

Unweighted Noise Level ( $\mu\text{veff}$ ):

3.6

4.5

Weighted Noise Level ( $\mu\text{veff}$  \*):

2.2 (max. 2.5)

2.3 (max. 3.1)

Equivalent Noise Level \*):

21 db

22 db

\*) Filter CCITT-C/DIN 45 405

Sensitivity to Magnetic Stray Field: at 50 Hz: 5  $\mu\text{v}/50$  mgauss

at 100 Hz: 8  $\mu\text{v}/50$  mgauss

at 1000 Hz: 80  $\mu\text{v}/50$  mgauss

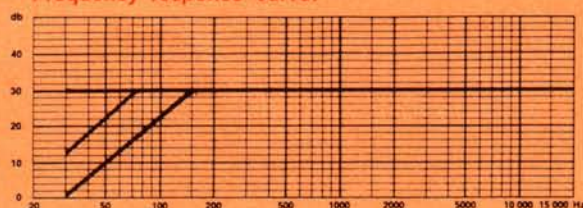
Load Impedance:  $\geq 500$  ohms

Weight: 85 g.; gross weight: 360 g.

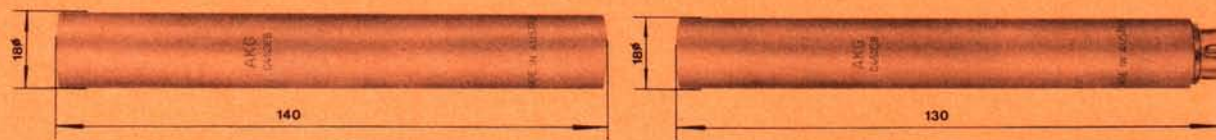
Temperature Range:  $-20^\circ\text{C} \dots +60^\circ\text{C}$

Humidity: at  $20^\circ\text{C} \dots 99\%$ , at  $60^\circ\text{C} \dots 95\%$

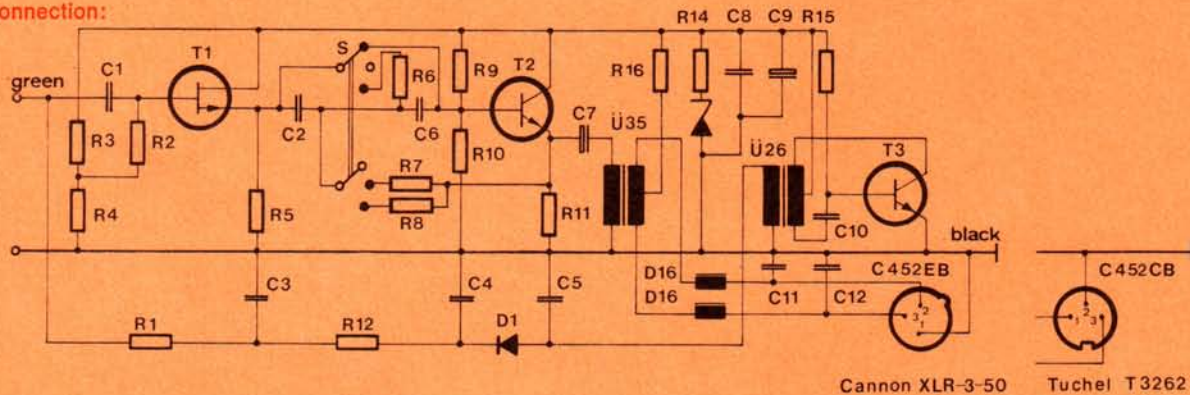
## Frequency response curve:



## Dimensions [mm.]:



## Connection:





# Other CMS-microphones

## C 414C comb/C 414E comb

Condenser microphone with 4 directional characteristics,  
condenser microphone preamplifier of semi-conductor  
design and capsule with a double-diaphragm system in one case

Switchable directional characteristic at uniform sensitivity:

Cardioid, Omni-directional, Figure-of-eight, Hyper-cardioid can be  
selected directly at the microphone

Built-in attenuation switch for a pre-attenuation of -10 db over the  
entire frequency range

The FET preamplifier offers:

High long-time stability

Minimum noise

High reliability

Functioning at relative humidity of up to 90%

Low current consumption

For standard phantom circuit with operating voltage of 9–52 v



Great stability of the screen cap ① due to the glass fiber reinforced plastic frame. Dust and wind noises are kept out by the double screen cap. Sensitive side: light-coloured screen. Back side: dark screen.

The large-surface diaphragms ② consist of gold vapor-plated mylar foil®. Great compactness and sturdiness of the system despite high electro-acoustic sensitivity as well as the choice of four different directional characteristics ③ (Cardioid, Omni-directional, Figure-of-eight, Hypercardioid — individually measured frequency curves come with the unit) are the advantages of this transducer design.

A pre-attenuation of -10 db within the entire frequency range can be selected by means of a built-in attenuation switch ④.

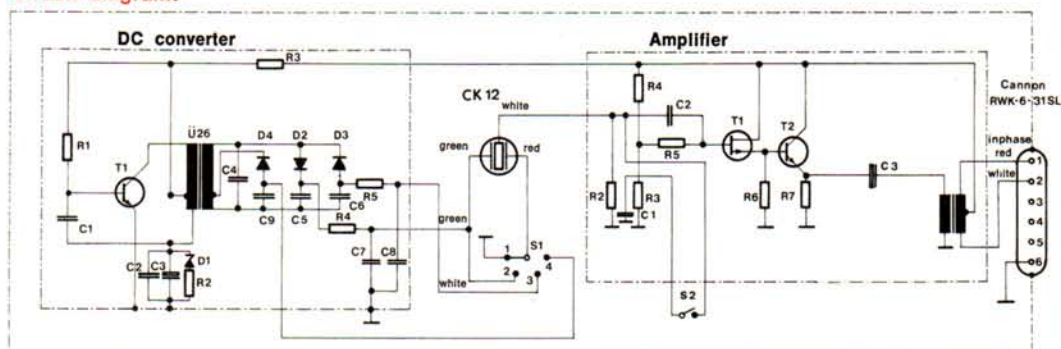
The TV-grey metal base ⑤ eliminates disturbing reflection of light. The microphone C 414 will be delivered in a stylish case.

The microphone's base has the 6-pole connector CANNON RWK-6-31 SL spez. ⑥ for the connection with the microphone stand adapter ⑦ (Mating plug CANNON RWK-6-22C-1/4").

The microphone cable is 20 m. long with one end permanently connected to the stand adapter. The other end — for the direct connection to phantom inputs or AKG CMS power supply units is provided either with a 3-pole DIN plug (cable designation MK 18/20) or with a 3-pole CANNON plug (cable designation MK 17/20).

The elastic rubber joint ⑧ as well as the electric insulation of the microphone from stand or suspension dampens shocks and impacts.

### Circuit diagram:





## Miniature Electret Condenser Lavalier Capsule with integrated FET-preamplifier

Meets the most stringent studio requirement for inconspicuous use (14.5 x 22 mm. only)

Omni-directional characteristics

Shock mounted, minimizing handling, clothing and cable rubbing noises

Equipped with rotary support clip and 7 m. long, 2-pole screened flexible grey cable terminating in screw-cap for connection to SE 5E or SE 5C

The CE 10 capsule operates in conjunction with the feeding unit SE 5E or SE 5C (battery box for 5.6 v Mallory PX 23 and circuitry for universal-phantom-powering)

There are two basic types of powering

Via the 5.6 v battery-cell (ON/OFF-switch just for battery) or externally via the universal-phantom-powering with operating voltages within the range of 9–52 v irrespective of the switch-position



### Technical Data:

Type: Electret pressure receiver with FET preamplifier integrated circuit

Frequency Response: 20 ... 18 000 Hz

Directional Polar Response: omni-directional

Sensitivity at 1000 Hz: 0.25 mV/ $\mu$ bar  $\approx$  2.5 mV/Pa

Impedance (within the range of 30 ... 10 000 Hz): 200 ohms  $\pm$  15%

Min. Actual Load Impedance: 500 ohms

Equivalent Noise Level: 28 db SPL (at a sensitivity of 0.25 mV/ $\mu$ bar)

(Filter CCITT-C/DIN 45 405)

Weight:

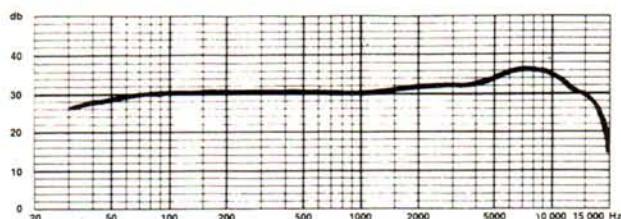
Microphone only: 3 grams

Microphone with cable and screw cap: 60 grams

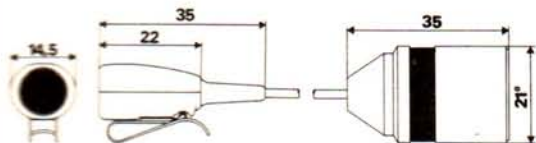
Temperature Range:  $-10^{\circ}$  C ...  $+70^{\circ}$  C

Humidity: at  $20^{\circ}$  C ... 99%, at  $60^{\circ}$  C ... 95% (max.)

### Frequency response curve:



### Dimensions [mm.]:



### Connection:

Electret Condenser Microphone

with integrated FET-preamplifier

