

# Measuring Microphones, Studio Microphones, Hydrophones and Accessory Equipment

types 2619, 2627 and 2633

## FEATURES:

- Small compact construction
- High input impedance
- Low output impedance
- Wide dynamic range
- Adapts to microphones with different diameters

## ADDITIONAL FEATURES TYPE 2627:

- Insert voltage calibration capability
- Standardized input configuration
- Conforms with IEC R 327 and ANSI S1.10-1966
- Attenuation < 0,08 dB

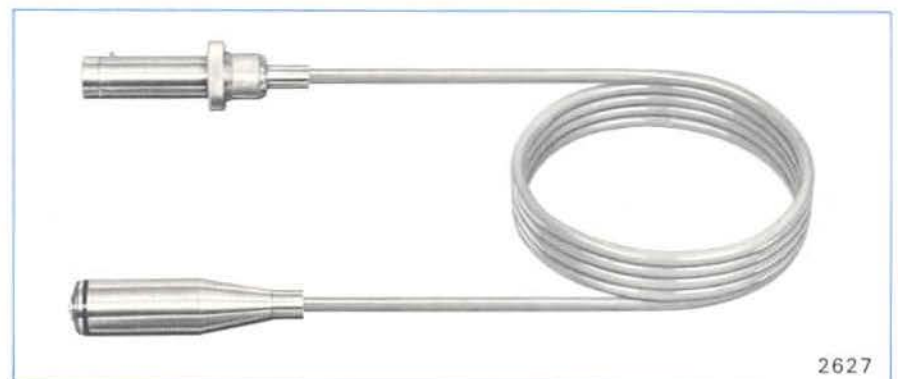
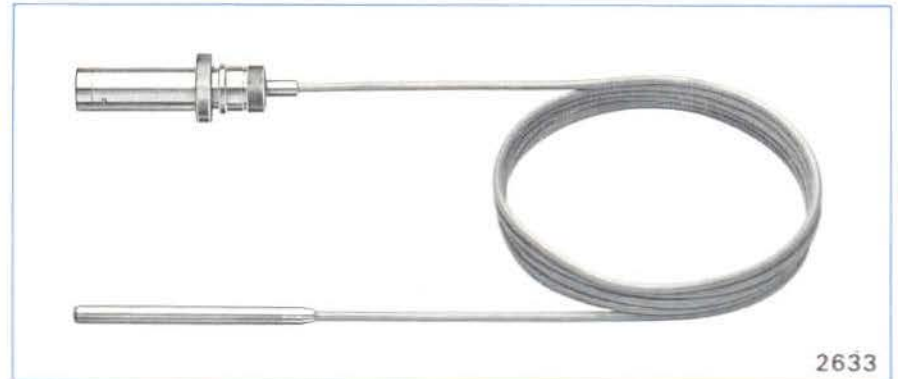
## USES:

- Sound measurements with B & K condenser microphones
- General purpose transducer preamplifier
- High impedance input probe for B & K measuring amplifiers and frequency analyzers

## ADDITIONAL USES TYPE 2627:

- Insert voltage calibration of condenser microphones for open circuit voltage determination
- Calibration of microphones in connection with reciprocity calibration apparatus
- Calibration of sound measuring set-ups

## Microphone Preamplifiers



The Preamplifiers Type 2619, 2627 and 2633 are designed especially to match the needs of the B & K condenser microphones but may find application whenever a very high input impedance is required from the B & K Measuring Amplifiers and Frequency Analyzers. They are small and compact in design and operate over a wide range of temperature, humidity and other environmental effects. The preamplifiers have a very high input impedance and present virtually no load to the microphone cartridges. This together with a very low inherent noise level, gives a low lower limiting frequency and a wide dynamic range. The low output impedance allows the connection of long cables between the preamplifier and the measuring instrument.

The preamplifiers are supplied

with power via a 7 core cable from the 7 pin preamplifier input socket on the B & K Measuring Amplifiers and Frequency Analyzers. Special power supplies are available for use if it is required to connect the preamplifier to other instrumentation. The polarization voltage for the microphone cartridge is supplied by the same input socket or power supply via the 7 core cable of the preamplifier and the preamplifier itself. Input adaptors connected instead of the microphone cartridges block this polarization voltage and allow connection of other transducers such as an accelerometer. Also they allow the preamplifier to be used as a general purpose high impedance input probe.

Fig.1 shows how the preamplifiers fit to the different microphones and the adaptors for direct electrical

input. The Dehumidifier shown is used with special microphones as indicated for measurements in humid atmospheres over longer periods of time.

For use with Microphone Type 4130, a low cost preamplifier Type 2642 is available. Please ask for separate Data Sheet.

N.B. Use of the Pre-polarized Microphones Types 4129, 4155 and 4176 with the Preamplifier Type 2619 requires the disconnection and grounding of the polarization voltage on earlier instruments. Current instruments are provided with a 0-28-200V selector. Please see the Type 4129/4155/4176 Data Sheet.



Fig.1. Adaptors required to connect B & K Condenser Microphones and direct electrical signals to the Preamplifiers Types 2633, 2619 and 2627

## Preamplifier 2619

This preamplifier fits directly onto the 1/2" microphone cartridges and adapts to the 1", 1/4" and 1/8" cartridges. It has a high input impedance and low inherent noise,

and can be operated either from a 120V supply, or from a 28V supply, such as the battery driven Microphone Power Supply 2804. A heater element is built into the tip of

the preamplifier to prevent condensation forming in the microphone if it is used in very humid environments.





Fig. 2. Type 2619S as delivered in mahogany case with accessories

Additional protection is obtained using the Dehumidifier and special microphones. If the 2619 is used with the Power Supply 2804 the current for the heater element must be supplied separately. The 2619 is delivered either as 2619S in a mahogany case containing the preamplifier, two adaptors and a flexible extension rod, or as 2619T in a plastic box containing only the preamplifier. The adaptors delivered with 2619S are the DB 0375 which



Fig. 3. Type 2619T as delivered in plastic box

allows 1" microphones to be used and the JJ 2615 allowing cables with microplugs to be connected (B&K no. AO 0038/0122). The Flexible Extension Rod UA 0196 is

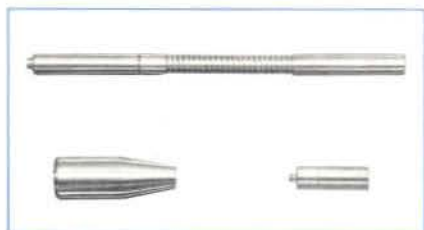


Fig. 4. Flexible Extension Rod UA 0196, Adaptor DB 0375 and Adaptor JJ 2615

used to increase the distance between the preamplifier and the microphone and to give directional flexibility to the microphone. Increased distance between preamplifier and transducer allows measurement at higher temperatures ( $150^{\circ}\text{C}$ ,  $302^{\circ}\text{F}$ ).

## Preamplifier 2633

This preamplifier is only  $1/4$ " in diameter and fits directly to the  $1/4$ " microphone cartridges while the  $1/8$ " cartridges are fitted by means of the Adaptor UA 0160. The preamplifier has a high input impedance and low inherent noise.



Fig. 5. The 2633 as delivered in mahogany case

## Preamplifier 2627

This preamplifier has been designed especially to allow calibration of the 1 inch B & K condenser microphone cartridges according to the insert voltage method either in connection with reciprocity calibration or by comparison with a known sound source. These methods are described in the IEC recommendation R 327 and in the American standard ANSI S1.10-1966.

The Type 2627 fulfils these recommendations and allows insert calibration to be made with Types 2610 and 2636 Measuring Amplifiers using external junction box ZH 0007 and an external oscillator. Some amplifiers and analyzers, e.g. Types 2606, 2607 (earlier types) 2010 and 2120 have a direct insert voltage calibration facility.

The preamplifier may be used in either driven shield or grounded

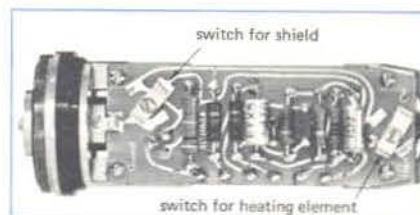


Fig. 6. View of the preamplifier with the housing removed, showing the contacts for connection/disconnection of the heating element and for grounding/driving the shield around the input contact to the output

shield configurations in order to be in complete agreement with methods used in standards laboratories throughout the world.

It contains an input stage, an output stage giving a low output impedance and the supply for the driven shield surrounding the input stage that minimises stray capacitances. The thread for the microphone cartridge is isolated from the preamplifier housing to allow an insert voltage to be applied in series with the microphone for finding its open circuit sensitivity. A heating element is built into the preamplifier to prevent condensation forming in the microphone or preamplifier when used in very moist environments. The heating element can be disconnected by means of a small switch situated on the printed circuit board. See Fig. 6. This allows microphone calibration to be made without any temperature influence from the preamplifier.

The shield around the input contact can be connected either to the output or to the ground by means of



Fig. 7. The Preamplifier Type 2627 as delivered in mahogany case



another switch also shown in Fig. 6. This allows use of either a driven or a grounded shield.

During design and manufacture of the preamplifier special attention has been given to keeping stray capacitances and leakage resistances at a minimum also when the preamplifier is used in moist environments. A double screening secures very low cross-talk (better than -60 dB at 1 kHz).

**Insert Voltage Calibration.** This type of calibration is used to find the open circuit sensitivity of a microphone, which is defined as the voltage appearing at its terminals when the microphone is working into an infinitely large electrical impedance and standardized mechanical configuration. It is measured by the substitution method where a known sound pressure is applied to the microphone diaphragm alternately with a calibration voltage applied in series with the microphone when the microphone is terminated in the same acoustic impedance. The calibration voltage is adjusted until the output voltage from the preamplifier is the same as when a given sound pressure is acting on the microphone diaphragm in the absence of the calibrating voltage. The open circuit sensitivity is then equal in magnitude to the calibration voltage

divided by the sound pressure applied.

**Insert Voltage Calibration with B & K Equipment.** The Preamplifier 2627 connects directly to the 7-pin preamplifier input of the Measuring Amplifiers Types 2606 and 2607 (earlier types) and the Frequency Analyzers Types 2010 and 2120. The input socket of these instruments delivers all necessary voltages for the preamplifier and the polarization voltage (200 V) for the microphone cartridge. The insert calibration voltage, which is also supplied via this socket, may originate either from the 1000 Hz reference oscillator built into these instruments or from an external signal source, for instance the Sine Generator 1023, in order to allow calibration at other frequencies and levels. For other instruments, including Measuring Amplifiers Types 2610 and 2636, external junction box ZH 0007 and an external oscillator must be used. As a sound source the Sound Level Calibrator Type 4230 working at 1000 Hz or the Pistophone Type 4220 working at 250 Hz may be used.

The Preamplifier Type 2627 is also delivered with the Reciprocity Calibration Apparatus Type 4143 which is designed for reciprocity calibration of 1" condenser micro-

phones in accordance with IEC 327 and 402, insert voltage calibration, comparison calibration and measurement of the frequency response of condenser microphones by the electrostatic actuator method.

## Application Ranges

The preamplifier Type 2619 in connection with a 1/2" or 1" condenser microphone creates a microphone assembly well suited for most sound measurements. The 2633 with a 1/4" or 1/8" microphone is specially designed for high intensity, high frequency applications. The small size and compact construction make it ideal for such applications as jet noise and boundary layer investigations.

The Type 2627 which is primarily designed for use where the insert voltage calibration technique is applied can be used with all B & K 1" condenser microphones for sound measurements. Special features for this purpose are a very low inherent noise level, and a very small attenuation. With an adaptor UA 0030, 1/2" microphones can be fitted.

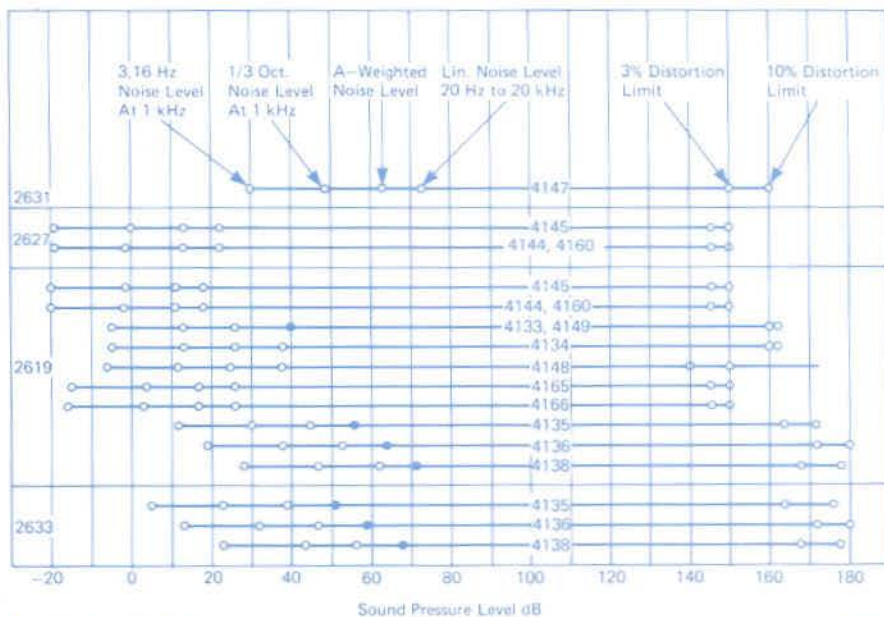
## Accessories

The preamplifiers are delivered with certain standard accessories as described. Full information on accessories available for use with the B & K condenser microphones and preamplifiers are given in the data sheet for the microphone cartridges.

### Extension cables

Three standard length extension cables are available. The cables have a very low capacitance and extremely good shielding so that several lengths can be connected together. The influence on distortion and high frequency response can be seen from Fig. 12 to Fig. 17. The table below gives the capacitance, diameter and length of the cables.

Extension Cable Type	AO 0027	AO 0028	AO 0029
Length	3 m 10 ft	10 m 33 ft	30 m 100 ft
Diameter	6 mm 1/4"	9 mm 3/8"	9 mm 3/8"
Capacitance to ground of the signal conductor	300 pF (100 pF/m)	570 pF (157 pF/m)	1700 pF (157 pF/m)



• Lin. 20 Hz to 200 kHz

Fig. 8. Compared dynamic ranges of all the B & K preamplifiers with different condenser microphones. For description of Type 2631 Carrier Frequency System see separate literature. The upper limits are indicated for two degrees of distortion while the lower limits are given for various bandwidths of the measuring equipment. The limits for 3.16 Hz and 1/3 octave bandwidth are valid at 1 kHz only

### Tape Cable AR 0001

This very flat, flexible 7 core cable is used when it is necessary to carry an extension cable through closed windows, doors, etc. The flat cable can easily follow sharp bends, the thickness being only 0,2 mm. Length of the cable is 300 mm (12"). Typical applications are in sound insulation and reverberation measurements in buildings.

### Frequency Response — Transducer Capacitance

The frequency response of the preamplifiers depends on the trans-

ducer capacitance connected to the preamplifier input and the capacitance load (extension cables) connected to the output. The curves below show the frequency response of the preamplifiers with different B & K condenser microphone cartridges and no extension cables connected.

Typical B & K microphone capacitances are:

Types 4144, 4145 and 4160: 50 to 66 pF (1" diameter)  
Types 4129, 4130, 4133,

4134, 4147, 4148, 4149, 4155, 4165, 4166 and 4176: 12,5 to 21 pF (1/2" diameter)  
Types 4135 and 4136: 6,4 pF (1/4" diameter)  
Type 4138: 3,5 pF (1/8" diameter)

The capacitance of the adaptors necessary to connect the cartridges to the preamplifiers has been included as indicated on the curves.

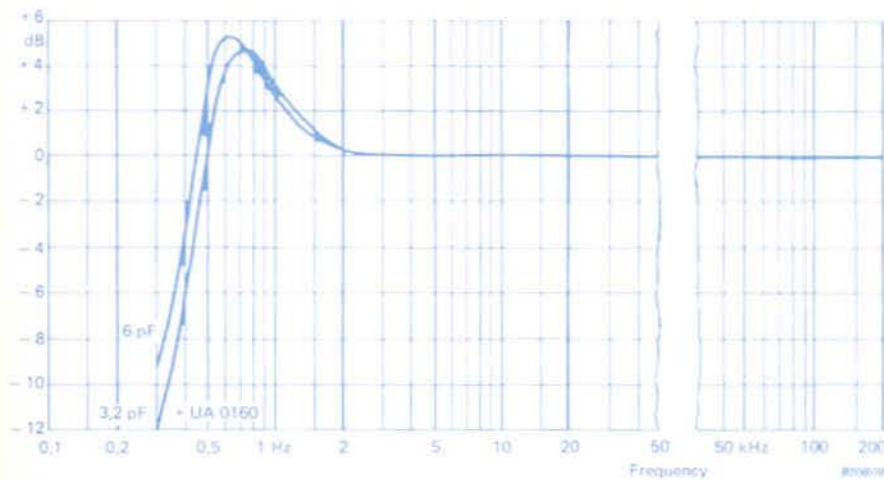


Fig.9. Pre-amplifier Type 2633. Frequency response curves with different transducer capacitances connected at the input

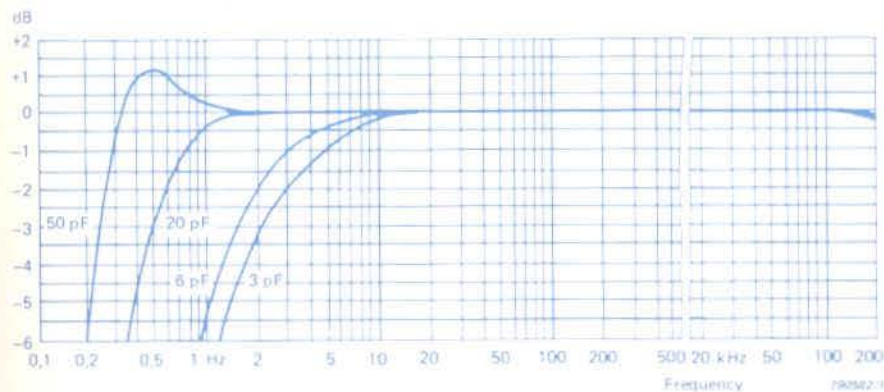


Fig.10. Pre-amplifier Type 2619. Frequency response curves with different transducer capacitances connected at the input

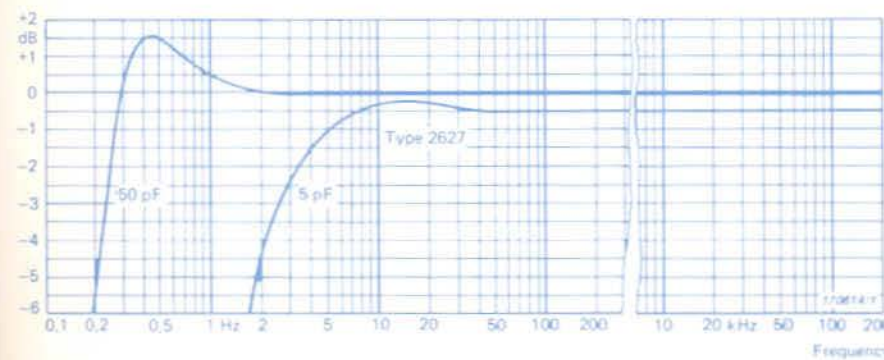


Fig.11. Pre-amplifier Type 2627. Frequency response curve of the preamplifier unloaded and an input capacitance of 50 pF corresponding to 1" microphone. Lower curve with 5 pF input capacitance indicates the influence on frequency response of varying input capacitances. With 50 pF input capacitance the response is linear from 2 Hz to 200 kHz  $\pm 0.5$  dB



### Loading — Frequency Response

The capacitive load of extension cables on the output of the preamplifiers will influence the frequency response and the upper distortion limit. The curves below show the in-

fluence on the high frequency cut-off at different load capacitances and different transducer capacitances corresponding to those of the B & K condenser microphone cartridges. When determining the total

frequency response of the preamplifier with extension cables these curves should be held together with the curves given for Frequency Response-Transducer Capacitance.

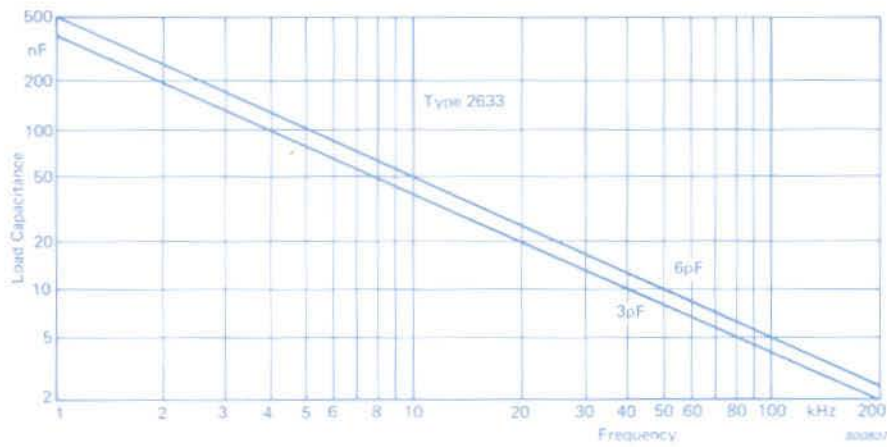


Fig.12. Pre-amplifier Type 2633. Upper frequency limit (-1 dB) as a function of load (extension cable capacitance) for different transducer capacitances

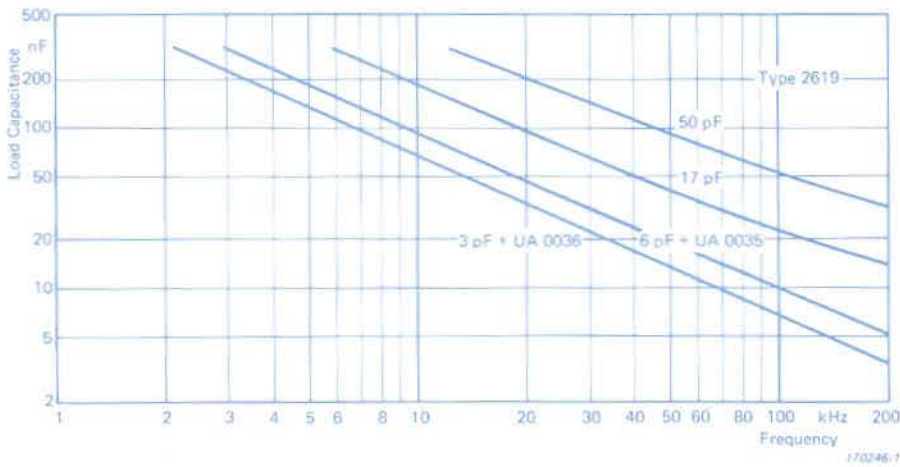


Fig.13. Pre-amplifier Type 2619. Upper frequency limit (-1 dB) as a function of load (extension cable capacitance) for different transducer capacitances

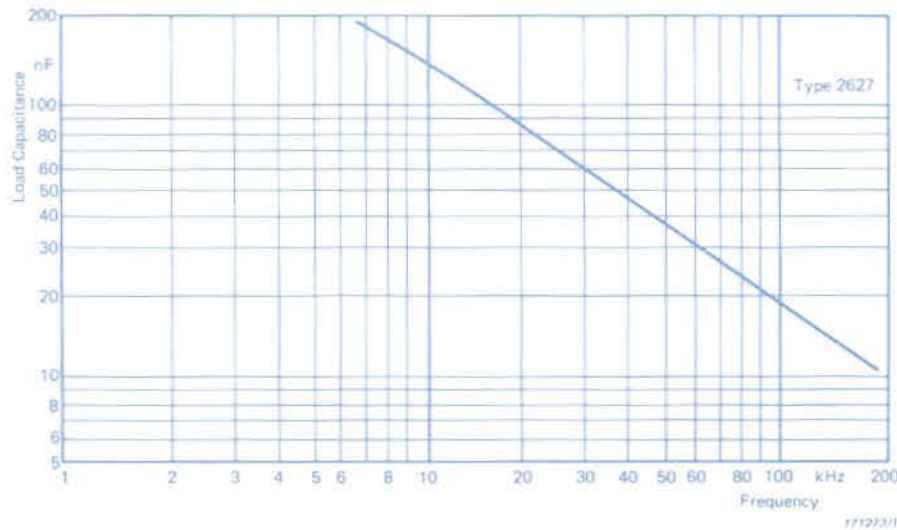


Fig.14. Pre-amplifier Type 2627. Upper frequency limit (-1 dB) as a function of load (extension cable capacitance) at 50 pF transducer capacitance

### Loading — Distortion

If the maximum output current of the preamplifier is exceeded the signal will be distorted. The curves be-

low give the upper distortion limit (4%) as a function of output voltage and load capacitance at the output

of the preamplifier. For normal cable lengths the distortion will be lower than 1%.

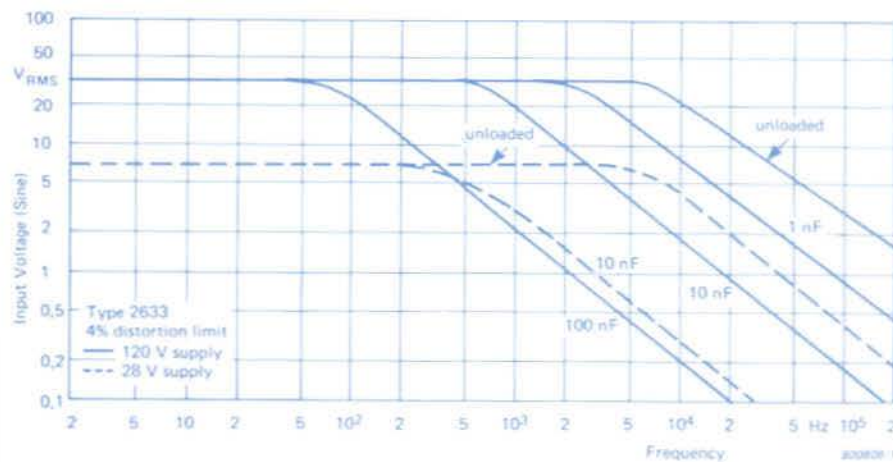


Fig. 15. Preamplifier Type 2633. Upper limit of dynamic range (4% distortion) due to capacitive loading as a function of input voltage and frequency

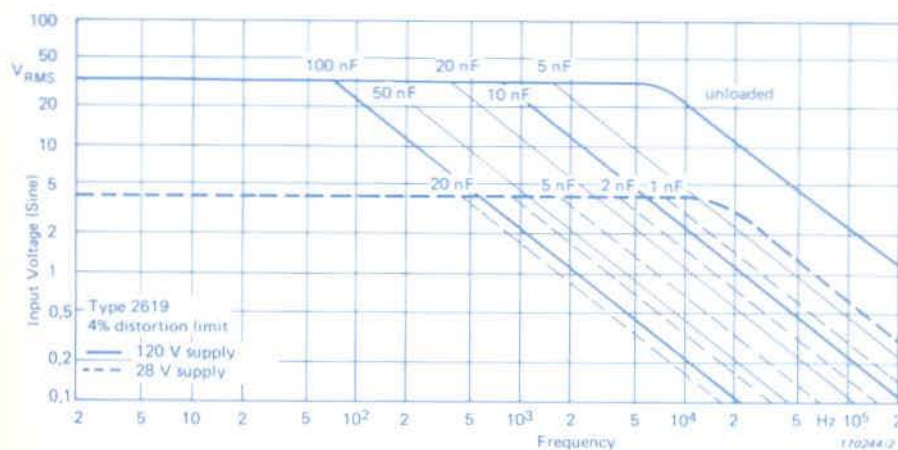


Fig. 16. Preamplifier Type 2619. Upper limit of dynamic range (4% distortion) due to capacitive loading as a function of input voltage and frequency

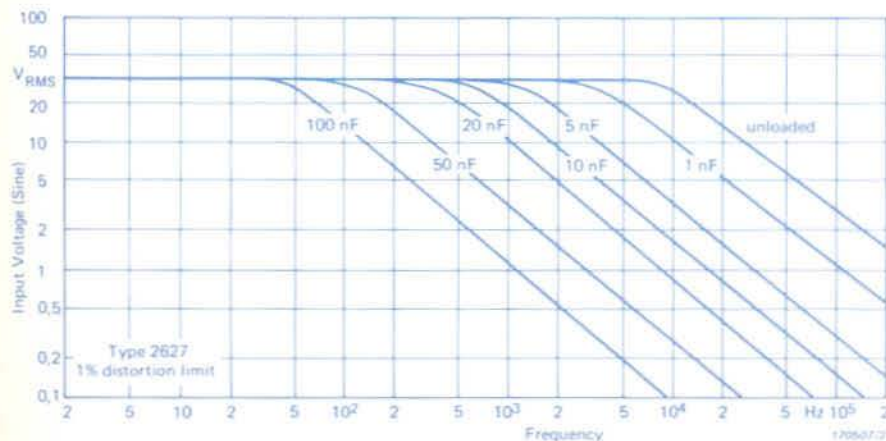


Fig. 17. Preamplifier 2627. Upper limit of dynamic range (1% distortion) due to capacitive loading (extension cables) as a function of input voltage and frequency



# Specifications 2619, 2627 and 2633

B & K Type no.	2633		2619		2627
DC Power Supply	120 V/2 mA	28 V/0,5 mA	120 V/2 mA	28 V/0,5 mA	120 V/2 mA
	Heater 12 V / 80 mA				Heater 12 V/60 mA
Polarization Voltage	Transmitted through preamplifier to microphone cartridge from power supply				
Input Impedance	>50 GΩ//0,25 pF at 60°C (approx. 5 GΩ//0,25 pF at 100°C)	10 GΩ//0,4 pF (typical)	> 10 GΩ/0,45 pF	> 7 GΩ/0,6 pF	grounded shield: < 5 pF driven shield: > 10 GΩ//< 0,5 pF
Output Impedance	< 100 Ω	600 Ω (typical)	< 25 Ω	< 70 Ω	< 50 Ω
Max. Output Current	1,4 mA peak	0,25 mA peak (typical)	1,5 mA peak	0,5 mA peak	1,4 mA peak
Temp. Range	-20° to +60°C* (-4° to 140°F)		-20° to +60°C (-4° to +140°F)	-20° to +60°C (-4° to +140°F)	-10° to +60°C (14° to 140°F)
Attenuation (Preamplifier alone)	< 0,06 dB	< 0,1 dB	< 0,03 dB	< 0,1 dB	< 0,08 dB
Phase (20 Hz to 20 kHz)	± 2,0°		± 2,5°		± 2,0°
Linearity (2 Hz to 200 kHz)	+ 8°, -13° (6 pF)		+ 20°, -13° (20 pF)		+ 2°, -12° (50 pF)
<b>Preamplifier Noise (dummy microphone):</b> Lin. 20 Hz to 200 kHz and A-weighted. Typical values are given in parentheses					
60 pF (1" microphone)	—	—	< 10 μV (7 μV) Lin. < 2 μV (1,7 μV) A-weighted		< 15 μV (9 μV) Lin. < 3 μV (2,3 μV) A-weighted
17 pF (1/2" microphone)	—	—	< 25 μV (12 μV) Lin. < 4,5 μV (3,3 μV) A-weighted		—
6 pF (1/4" microphone)	< 30 μV (19 μV) Lin. < 7 μV (5,8 μV) A-weighted Approx. 150 μV, 34 μV at 100 °C		< 50 μV (23 μV) Lin. < 15 μV (7,5 μV) A-weighted		—
3,5 pF (1/8" microphone)	< 50 μV (23 μV) Lin. < 12 μV (7 μV) A-weighted		< 70 μV (50 μV) Lin. < 25 μV (14 μV) A-weighted		—
Dimensions:	Diameter:	6,35 mm (0,25 in)	12,7 mm (0,5 in)		23,8 mm (0,936 in)
	Length:	88 mm (3,46 in)	83 mm (3,25 in)		99 mm (3,9 in)
Cable Length	3,4 m (11,2 ft)		2 m (6,6 ft)		2 m (6,6 ft)

<p><b>Frequency Range:</b> See Figs. 9, 10, and 11</p> <p><b>Distortion:</b> See Figs. 15, 16, and 17</p> <p><b>Max. Input Voltage:</b> See Figs. 15, 16, and 17</p> <p><b>Connection Type:</b> B &amp; K 7 pin plug</p> <p><b>Accessories Included:</b> Type 2619S: Adaptor for 1" microphones DB 0375 Coaxial Input Adaptor JJ 2615 Flexible Extension Rod UA 0196</p>	<p><b>Type 2619T:</b> None</p> <p><b>Type 2633:</b> None</p> <p><b>Type 2627:</b> Coaxial Input Adaptor JJ 2612 Small screwdriver QA 0001</p> <p><b>Accessories Available:</b></p> <p><b>Extension cables:</b> AO 0027, length 3 m (10 ft) AO 0028, length 10 m (33 ft) AO 0029, length 30 m (100 ft)</p> <p><b>Tape Cable:</b> AR 0001, length 300 mm (12")</p>	<p><b>UA 0588:</b> Adaptor for mounting 1" and 1/2" microphone preamplifiers on tripods with 3/8" W thread</p> <p><b>Portable Floor Stand UA 0587:</b> For Types 2619 and 2627 (includes adaptor UA 0588)</p> <p><b>Insert Voltage Junction Box ZH 0007:</b> (for Type 2627 only)</p> <p><b>Microphone Power Supplies:</b></p> <p><b>Type 2804,</b> 2 channel, battery driven, for Type 2619 and 2633</p> <p><b>Type 2807,</b> 2 channel, automatic switching between channels</p>
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\* Up to 100°C (212°F) with reduced specifications, see Input Impedance and Preamplifier Noise entries