

# PRODUCT DATA

## High-pressure Microphone Calibration System — Type 9719

*Sound measurements are made over wide dynamic ranges, exceeding those related to human hearing. To ensure valid results, there is a need for calibration methods that cover correspondingly wide ranges.*

*For further information read "Verification of High-pressure Linearity and Distortion of Measurement Microphones" by Erling Frederiksen on [http://www.bksv.com/pdf/paper\\_ica\\_04\\_529.pdf](http://www.bksv.com/pdf/paper_ica_04_529.pdf).*

### USES

- Level linearity calibration of microphones and sound level meters
- Linearity calibration from medium to high pressure levels
- Harmonic distortion measurements

### Description

Type 9719 is a turnkey system that generates a well-defined excitation signal and analyses the output of the tested microphone. The source part of Type 9719 consists of a generator, a power amplifier and a loudspeaker. The generated signal is amplified to drive the loudspeaker placed inside a measurement tube. This tube is coupled to a smaller tube, where the high pressure is generated and the tested microphone and a monitor microphone are placed. An acoustic resonance inside the tubes amplifies the sound pressure and produces a very high pressure with low distortion at the microphone positions. The system uses a Reference and a Monitor Microphone. All measurements are referred to the pressure measured with the Reference Microphone, which is calibrated using a Reference Pistonphone at 124 dB SPL (RMS).



### Linearity Measurement

The level linearity is measured relative to 124 dB SPL in the dynamic range of the individual microphone type up to a maximum level of 171 dB SPL, RMS (174 dB SPL, Peak) at 500 Hz.

### Distortion Measurement

The system measures 2nd, 3rd and also the total harmonic distortion components at fixed sound levels and calculates their levels relative to that of the fundamental frequency.

### Linearity of Reference Microphones

For verification and description go to [http://www.bksv.com/pdf/paper\\_ica\\_04\\_529.pdf](http://www.bksv.com/pdf/paper_ica_04_529.pdf).

**Fig. 1 Left:** Harmonic distortion of ½" Microphone Type 4192 and ½" Preamplifier Type 2669; **Right:** The same, but with 100 pF loading of the microphone (UC 0211)

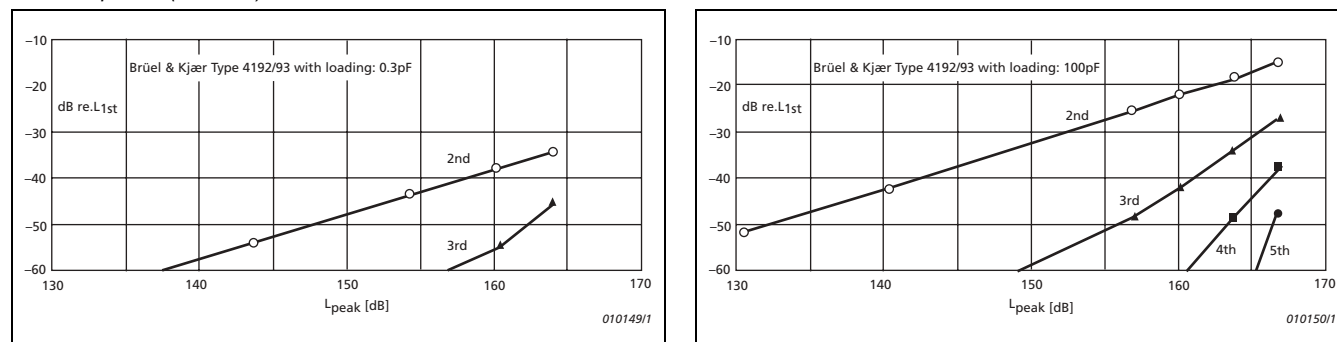


Fig. 1 illustrates the distortion of two sets of measurement equipment that apply the same type of microphone but different preamplifier circuits, which are optimised for general and low-frequency operation, respectively. As shown, the harmonic distortion depends on a combination of the microphone and the preamplifier. The microphone, the preamplifier and a combination of both can cause dynamic non-linearity and distortion, which should, therefore, be tested and evaluated to ensure valid measurement results. The High-pressure Microphone Calibration Sys-

tem was developed for making such tests. Both the system and a calibration service are now available to customers.

### The Importance of Calibration

Both large and small deviation in your equipment can cost you a lot of money or reputation.

- Avoid producing faulty measurements or products
- Avoid rework
- Quality assurance

## Specifications – High-pressure Microphone Calibration System Type 9719

### RANGE

94 – 171 dB re. 20  $\mu$ Pa  
97 – 174 dB re. 20  $\mu$ Pa (Peak)

### RMS LINEARITY

Response is measured relative to  
124 dB<sub>SPL,RMS</sub>

### Uncertainty:

0.05 dB at 94 – 164 dB<sub>SPL,RMS</sub>  
0.09 dB at 164 – 171 dB<sub>SPL,RMS</sub>

### PEAK + AND PEAK – LINEARITY

Response is measured relative to  
124 dB<sub>SPL,RMS</sub> + 3 dB

### Uncertainty:

0.06 dB at 124 – 164 dB<sub>SPL,RMS</sub>  
0.10 dB at 164 – 171 dB<sub>SPL,RMS</sub>

### DISTORTION

The 2nd, 3rd and the total harmonic distortions are documented for each level

## Ordering Information

### High-pressure Microphone Calibration

#### System Type 9719 includes:

Type 4298 High-pressure Unit  
Type 3560 Multi-analyzer System  
Type 4941 High-level Pressure-field ¼" Microphone  
Model 2510 Piezoelectric Microphone (ENDEVCO)  
plus accessories, software etc.

### CALIBRATION SERVICE PRODUCTS

BK-0090--- 1" Microphone Traceable High-pressure Calibration  
BK-0091--- ½" Microphone Traceable High-pressure Calibration  
BK-0092--- ¼" Microphone Traceable High-pressure Calibration  
BK-0093--- 1/8" Microphone Traceable High-pressure Calibration

Brüel & Kjær reserves the right to change specifications and accessories without notice

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