

BRÜEL & KJÆR® Transducers

¼-inch Free-field Microphone Type 4939

Type 4939 is designed for high-level and high-frequency measurements where a microphone with free-field response is needed. Being externally polarized, Type 4939 must be used with a classical preamplifier.



080110

Uses

- High-level measurements
- High-frequency measurements
- Model testing

Features

- Sensitivity: 4 mV/Pa
- Frequency: 4 Hz to 100 kHz
- Dynamic Range: 28 to 164 dB
- Temperature: -40 to +150 °C (-40 to +302 °F)
- Polarization: 200 V external

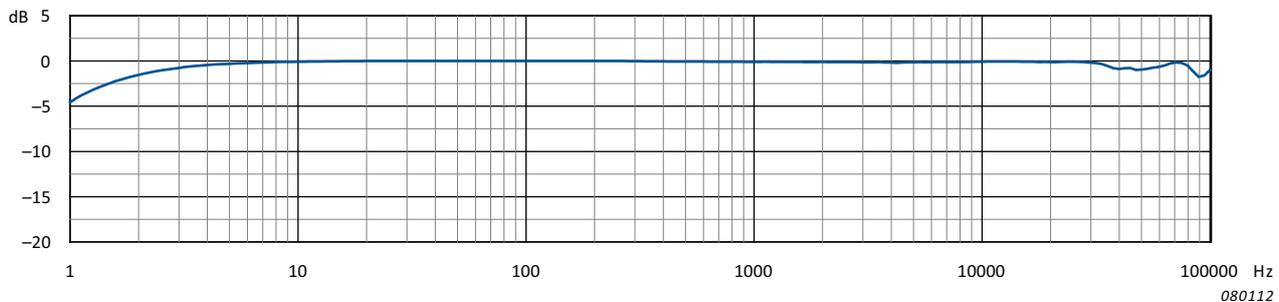
Use of Free-field Microphones

At higher frequencies, reflections and diffractions cause a pressure increase in front of the diaphragm. If not corrected, this would result in an increased output voltage from the microphone. A free-field optimisation means that the frequency response of the microphone has been designed in such a way that the free-field response at 0 degrees incidence is flat. This is only valid when the microphone is used without the protection grid.

Free-field microphones are suited for sound measurements in an anechoic chamber or far away from reflecting buildings and the like. Free-field microphones are also used in general electro-acoustics, like loudspeaker and microphone measurements.

Type 4939 is suited for all high-level, high-frequency measurements where a robust and stable free-field microphone is required.

Fig. 1 Typical free-field response of Type 4939 without protection grid. The low-frequency response is valid when the vent is exposed to the sound field



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Polarization Voltage

Type 4939 requires an external polarization voltage and must, therefore, be used with a classical preamplifier. Externally polarized microphones may be used at higher temperatures without severe changes in sensitivity.

Manufacturing and Stability

A laser-welded, stainless-steel diaphragm ensures superior long-term stability and mechanical robustness. Type 4939 will withstand the 1 m drop test of IEC 60068-2-32.

All Brüel & Kjær microphones are assembled in a clean room. This ensures that the microphones maintain their inherent noise floor and high stability, even when used in environments with a combination of high humidity and high temperature.

TEDS Microphones

A 'TEDS microphone' is a combined cartridge and a preamplifier with TEDS (transducer electronic data sheet). It is assembled and sealed in a clean environment. The microphone is considered one unit, with a single type and serial number. Each TEDS is programmed with the loaded sensitivity of the actual cartridge, making its data readily available in TEDS-compliant data acquisition and analysis systems

Type 4939 is available in three TEDS combinations, all using classical preamplifiers and all complying with IEEE P1454.4 version 0.9. A mapping that complies with IEEE 1454.4 version 1.0 is available on request.

Individual Calibration Data

Each Type 4939 comes with an individual calibration chart with information about the open-circuit sensitivity, the frequency response in a free field as well as the electrostatic actuator response.

Specifications

NOTE: All values are typical at 23 °C (73.4 °F), 101.3 kPa and 50% RH unless otherwise specified

| STANDARD | |
|--|---|
| IEC 61094-4 Type Designation | WS 3F (up to 100 kHz) |
| DYNAMIC CHARACTERISTIC | |
| Polarization Voltage | 200 V |
| Open-circuit Sensitivity (250 Hz)* | 4 mV/Pa, -48 dB ±3 dB re 1 V/Pa |
| 0° Incidence Free Field Response* | 4 Hz to 100 kHz: ±2 dB |
| Lower Limiting Frequency (-3 dB)* | 0.3 to 3 Hz |
| Pressure Equalization Vent | Side vented |
| Diaphragm Resonance Frequency | 80 kHz (90° phase shift) |
| Polarized Cartridge Capacitance* | 6.1 pF at 250 Hz |
| Equivalent Air Volume | 0.6 mm ³ (250 Hz) |
| Cartridge Thermal Noise | 28 dB(A), 33 dB(Lin 20 Hz to 100 kHz) |
| Upper Limit of Dynamic Range (3% distortion) | >164 dB SPL † |
| Max. Sound Pressure Level | 174 dB(peak) |
| ENVIRONMENTAL CHARACTERISTICS | |
| Operating Temperature Range | -40 to +150 °C (-40 to +302 °F) |
| Storage Temperature | In microphone box |
| | With mini CD |
| Temperature Coefficient (250 Hz) | +0.003 dB/K (-10 to +50 °C (+14 to 122 °F)) |
| Pressure Coefficient | -0.007 dB/kPa |
| Operating Humidity Range | 0 to 100% RH (without condensation) |
| Influence of Humidity | <0.1 dB in the absence of condensation |
| Vibration Sensitivity (<1000 Hz) | 60 dB equivalent SPL for 1 m/s ² axial vibration |
| Magnetic Field Sensitivity | 10 dB SPL for 80 A/m, 50 Hz field |
| PHYSICAL CHARACTERISTICS | |
| Thread for Preamp Mounting | 5.7 mm - 60 UNS |
| Dimensions | |
| | |

* Individually calibrated
 † 162 dB (peak) with ±15 V supply

COMPLIANCE WITH STANDARDS



An enclosed mini CD contains calibration data at 1/12-octave frequencies plus a wealth of technical information, such as the influence of different accessories, the frequency response in different sound fields and much more. Using the CD data and the REq-X feature of BK Connect® and PULSE™ LabShop, a real-time correction for different measurement situations, can increase measurement accuracy.

Ordering Information

Type 4939 ¼-inch Free-field Microphone

Includes the following accessories:

- Calibration chart*
- Microphone mini CD*

* State the microphone serial number if re-ordering calibration data

| TEDS COMBINATION | |
|----------------------|---|
| Type 4939-A-011 | ¼-inch Free-field Microphone, with Preamp Type 2670 |
| Type 4939-B-002 | ¼-inch Free-field Microphone, with Preamp Type 2669-B and Adaptor UA-0035 |
| Type 4939-C-002 | ¼-inch Free-field Microphone, with Preamp Type 2669-C and Adaptor UA-0035 |
| Type 4939-L-002 | ¼-inch Free-field Microphone, with Preamp Type 2669-L and Adaptor UA-0035 |
| OPTIONAL ACCESSORIES | |
| Type 2669-B | ½-inch Microphone Preamp, B&K connector |
| Type 2669-C | ½-inch Microphone Preamp, LEMO 1B connector |
| Type 2669-L | ½-inch Microphone Preamp, 7-pin LEMO connector |
| Type 2670 | ½-inch Microphone Preamp, 7-pin circular |
| Type 4231 | Sound Calibrator |
| Type 4228 | Pistonphone |
| Type 4226 | Multifunction Acoustic Calibrator |
| DP-0775 | ¼-inch Adaptor for Calibration |
| UA-0033 | Electrostatic Actuator |
| DB-0264 | ¼-inch Adaptor for Electrostatic Actuator |
| UA-0035 | ¼ to ½-inch Preamp Adaptor, length = 72.5 mm |
| EU-4000 | Angle Piece |
| UA-0385 | Nose Cone |
| WQ-1099 | Windscreen, round, 65 mm diameter |
| WQ-1133 | Windscreen, elliptical, 38 × 55 mm |
| CALIBRATION SERVICES | |
| MIC-CAI | Accredited Initial Calibration |
| MIC-CAF | Accredited Calibration |
| MIC-CFF | Factory Standard Calibration |

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Skodsborgvej 307 · DK-2850 Nærum · Denmark
 Telephone: +45 77 41 20 00 · Fax: +45 45 80 14 05
 www.bksv.com · info@hbkworl.com
 Local representatives and service organizations worldwide

To learn more about all HBK offerings, please visit hbkworl.com

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