

# BRÜEL & KJÆR® Transducers

## 1/4-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

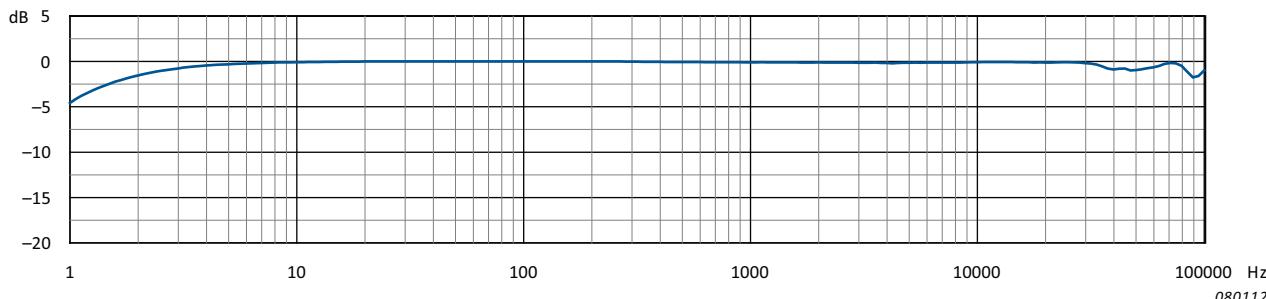
### Use of Free-field Microphones

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.

### 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.

### 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.

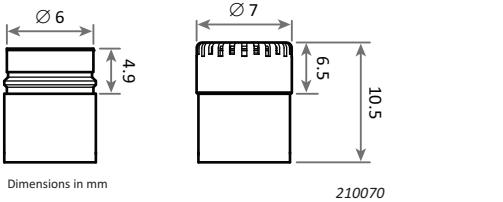
## Individual Calibration Data

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.

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.

## 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 <sup>3</sup> (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 <sup>†</sup>
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: -30 to +70 °C (-22 to +158 °F) With mini CD: +5 to 50 °C (+41 to 122 °F)
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 <sup>2</sup> axial vibration
Magnetic Field Sensitivity	10 dB SPL for 80 A/m, 50 Hz field
PHYSICAL CHARACTERISTICS	
Thread for Preamplifier Mounting	5.7 mm – 60 UNS
Dimensions	 <p>Dimensions in mm</p> <p>210070</p>

\* Individually calibrated

† 162 dB (peak) with ±15 V supply

## COMPLIANCE WITH STANDARDS



## Ordering Information

### Type 4939 1/4-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	1/4-inch Free-field Microphone, with Preamplifier Type 2670
Type 4939-B-002	1/4-inch Free-field Microphone, with Preamplifier Type 2669-B and Adaptor UA-0035
Type 4939-C-002	1/4-inch Free-field Microphone, with Preamplifier Type 2669-C and Adaptor UA-0035
Type 4939-L-002	1/4-inch Free-field Microphone, with Preamplifier Type 2669-L and Adaptor UA-0035
OPTIONAL ACCESSORIES	
Type 2669-B	1/2-inch Microphone Preamplifier, B&K connector
Type 2669-C	1/2-inch Microphone Preamplifier, LEMO 1B connector
Type 2669-L	1/2-inch Microphone Preamplifier, 7-pin LEMO connector
Type 2670	1/2-inch Microphone Preamplifier, 7-pin circular
Type 4231	Sound Calibrator
Type 4228	Pistonphone
Type 4226	Multifunction Acoustic Calibrator
DP-0775	1/4-inch Adaptor for Calibration
UA-0033	Electrostatic Actuator
DB-0264	1/4-inch Adaptor for Electrostatic Actuator
UA-0035	1/4 to 1/2-inch Preamplifier 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