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PRODUCT DATA

½″ Prepolarized Free-field Microphone — Type 4189

Type 4189 is designed for high-precision, free-field measurements where a microphone with high sensitivity is required. Being prepolarized, Type 4189 can be used with both DeltaTron® and classical preamplifiers.



080143

USES

- Precision sound measurement
- Premium class sound level meters
- Equipment complying with IEC 61672 class 1

FEATURES

- Sensitivity: 50 mV/Pa
- Frequency: 6.3 Hz – 20 kHz
- Dynamic Range: 14.6 – 146 dB
- Temperature: –30 to +150°C (–22 to +302°F)
- Polarization: Prepolarized

Use of Free-field Microphones

At higher frequencies, reflections and diffractions causes a pressure increase in front of the diaphragm of a microphone. If not corrected, for this would result in an increased output voltage. 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 microphone is optimised for use with the protection grid in place.

Free-field microphones are commonly used for sound measurement in an anechoic chamber or far away from reflecting buildings, etc. Another area for free-field microphones is for general electroacoustic measurements purposes like loudspeaker and microphone measurements.

Type 4189 is suited for use in class 1 Sound Level Meters and for all high-precision acoustic measurements where a robust and stable free-field microphone with an upper frequency of 20 kHz is required.

Manufacturing and Stability

A press-fitted, stainless-steel diaphragm ensures superior long-term stability and mechanical robustness – Type 4189 will withstand the 1 m drop test of IEC 60068–2–32.

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

Polarization Voltage

Being prepolarized, Type 4189 is especially well suited for battery operated equipment and operation in environments with high humidity.

TEDS Microphones

Type 4189 is available in TEDS combinations with either classical or DeltaTron type preamplifier. The TEDS microphone is considered one unit and has been sealed in a clean environment. The TEDS is programmed with the loaded sensitivity of the actual cartridge and the data is therefore readily available. The default TEDS template is to IEEE P1451.4 but TEDS to IEEE 1451.4 is available on request.

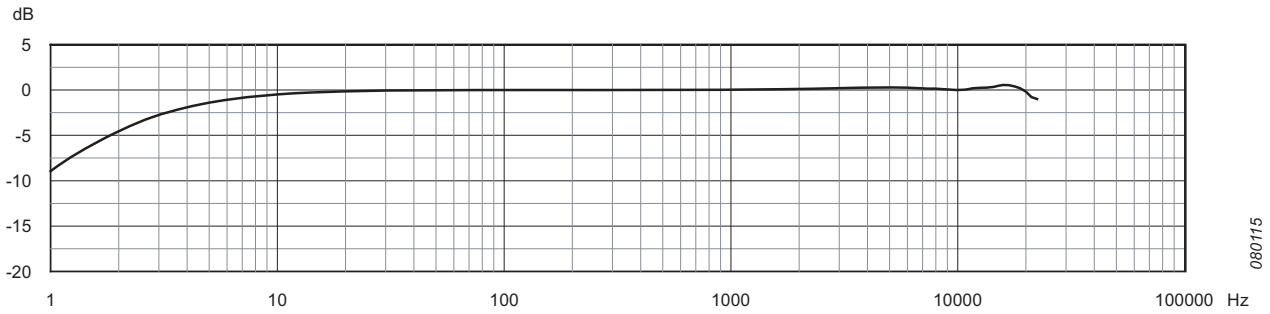
Individual Calibration Data

Each Type 4189 comes with an individual calibration chart including 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 the individual calibration data at 1/12-octave frequencies plus a wealth of technical information, such as the influence of different accessories, response in different sound fields and much more. Using the CD data and the REq-X feature of PULSE™, a real-

time correction for different measurement situations, can increase measurement accuracy.

Fig. 1 *Typical free-field response of the microphone with protection grid. The low-frequency response is valid when the vent is exposed to the sound field*



Specifications – ½″ Free-field Microphone Type 4189 (valid from serial number 2495387)

IEC 61094–4 Type Designation: WS2F
Polarization Voltage: 0 V (prepolarized)
Open-circuit Sensitivity (250 Hz)[a]**:**
50 mV/Pa, –26 dB ±1.5 dB re 1 V/Pa
0° Incidence Free-field Response[a]**:**
10 Hz to 8 kHz: ±1 dB
6.3 Hz to 20 kHz ±2 dB
Lower Limiting Frequency (–3 dB)[a]**:**
2 to 4 Hz
Pressure Equalization Vent: Rear vented
Diaphragm Resonance Frequency:
14 kHz (90° phase shift)
Cartridge Capacitance[a]**:** 14 pF at 250 Hz
Equivalent Air Volume: 46 mm^3 (250 Hz)
Pistonphone Correction (Type 4228 with DP-0776) 0.00 dB
Cartridge Thermal Noise:
14.6 dB(A), 15.3 dB(Lin)
Upper Limit of Dynamic Range (3% Distortion): >146 dB SPL[b]

a. Individually calibrated

Max. Sound Pressure Level: 158 dB (peak)

ENVIRONMENTAL
Operating Temperature Range:
–30 to +150°C (–22 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):
–0.006 dB/K (–10 to +50°C, 14 to 122°F)
Pressure Coefficient: –0.01 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): 62.5 dB equivalent SPL for 1 m/s^2 axial vibration

b. 137 dB (peak) with DeltaTron preamplifier and 24 V supply and 140 dB (peak) with ±15 V supply

Magnetic Field Sensitivity:
6 dB SPL for 80 A/m, 50 Hz field
Estimated Long-term Stability:
>1000 years/dB in dry air at 20°C (68°F)
>2 hours/dB in dry air at 150°C (302°F))
>40 years/dB in air at 20°C (68°F), 90% RH)
>1 year/dB in air at 50°C (122°F), 90% RH)

DIMENSIONS
Diameter with Grid: 13.2 mm (0.52″)
Diameter without Grid: 12.7 mm (0.50″)
Height with Grid: 17.6 mm (0.69″)
Height without Grid: 16.3 mm (0.64″)

Thread for Preamplifier Mounting:
11.7 mm–60 UNS

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

CE Compliance with EMC Directive

Ordering Information

Type 4189	½″ Prepolarized Free-field Microphone

Includes the following accessories:
- BC-0224: Calibration Chart[c]
- BC-5002: Microphone Mini-CD[c]

TEDS COMBINATIONS

4189-A-021	½″ Free-field Microphone with Preamplifier Type 2671
4189-A-031	½″ Free-field Microphone with Preamplifier Type 2699
4189-B-001	½″ Free-field Microphone with Preamplifier Type 2669-B
4189-C-001	½″ Free-field Microphone with Preamplifier Type 2669-C
4189-L-001	½″ Free-field Microphone with Preamplifier Type 2669-L
4189-W-003	½″ Free-field Microphone with Preamplifier Type 2671-W-001

c. State microphone serial number if re-ordering calibration data

OPTIONAL ACCESSORIES

Type 2669	½″ Microphone Preamplifier
Type 2671	½″ DeltaTron Preamplifier
2671-W-001	½″ DeltaTron Preamplifier (version with LLF < 1.2 Hz)
Type 2699	½″ DeltaTron Preamplifier, A-weighted
Type 4231	Sound Calibrator
Type 4228	Pistonphone
Type 4226	Multifunction Acoustic Calibrator
DP-0776	Calibration Adaptor for ½″ Microphones
UA-0033	Electrostatic Actuator
UA-1260	½″ Angle Adaptor (approx. 80°)
UA-0386	Nose Cone for ½″ Microphone
UA-0237	Windscreen for ½″ microphone, 90 mm diameter
UA-0459	Windscreen for ½″ microphone, 65 mm diameter
BA 5105	The Microphone Handbook

CALIBRATION SERVICES

4189-CAI	Accredited Initial Calibration
4189-CAF	Accredited Calibration
4189-CFF	Factory Standard Calibration

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

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