

PRODUCT DATA

1/2" Free-field Microphone — Type 4191

Type 4191 is designed for high-precision, free-field measurements where a wide bandwidth is required. Being externally polarized, Type 4191 must be used with a classical preamplifier.



080145

USES

- Precision measurements to 40 kHz
- Premium class sound level meters
- Equipment complying with IEC 61672 class 1

FEATURES

- Sensitivity: 12.5 mV/Pa
- Frequency: 3.15 Hz – 40 kHz
- Dynamic Range: 20 – 162 dB
- Temperature: –30 to +300°C (–22 to +572°F)
- Polarization: 200 V

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 like loudspeaker and microphone measurements.

With an upper frequency of 40 kHz, Type 4191 is especially suited all high-precision electroacoustic measurements as well as general acoustic measurements where a robust and stable free-field microphone is required. Despite the 40 kHz upper frequency, this microphone is optimised to operate with the protection grid in place.

Manufacturing and Stability

A press-fitted, stainless-steel diaphragm ensures superior long-term stability and mechanical robustness – Type 4191 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

Type 4191 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

Type 4191 is available in TEDS combinations with the classical Microphone Preamplifier Type 2669. 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.

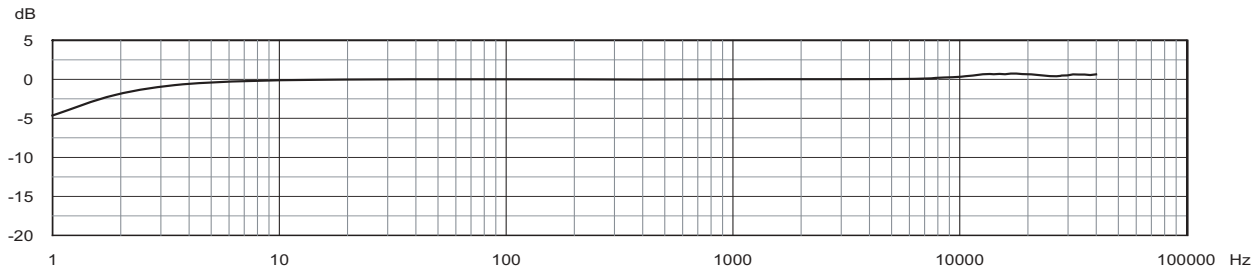
Individual Calibration Data

Each Type 4191 comes with an individual calibration chart including information about the open-circuit sensitivity, the free-field frequency response 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



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Specifications – ½" Free-field Microphone Type 4191

IEC 61094–4 Type Designation: WS2F

Polarization Voltage: 200 V (external)

Open-circuit Sensitivity (250 Hz)^a:

12.5 mV/Pa, –38 dB ± 1.5 dB re 1 V/Pa

0° Incidence Free-field Response^a:

5 Hz to 16 kHz: ± 1 dB

3.15 Hz to 40 kHz ± 2 dB

Lower Limiting Frequency (–3 dB)^a:

1 to 2 Hz

Pressure Equalization Vent: Side vented

Diaphragm Resonance Frequency:

34 kHz (90° phase shift)

Cartridge Capacitance (Polarized)^a:

18 pF at 250 Hz

Equivalent Air Volume: 11.6 mm³ (250 Hz)

Pistonphone Correction (Type 4228 with DP-0776) 0.02 dB

Cartridge Thermal Noise:

20 dB(A), 21.4 dB(Lin)

Upper Limit of Dynamic Range

(3% Distortion): >162 dB SPL^b

Max. Sound Pressure Level: 171 dB (peak)

ENVIRONMENTAL

Operating Temperature Range:

–30 to +150°C (–22 to +302°F)

Useable up to 300°C with a permanent

sensitivity change of approx. 0.4 dB, which stabilizes after one hour

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):

–0.002 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): 65.5 dB equivalent SPL for 1 m/s² axial vibration

Magnetic Field Sensitivity:

16 dB SPL for 80 A/m, 50 Hz field

Estimated Long-term Stability:

> 1000 years/dB in dry air at 20°C (68°F)

> 100 hours/dB in dry air at 150°C (302°F)

DIMENSIONS

Diameter with Grid: 13.2 mm (0.52")

Diameter without Grid: 12.7 mm (0.50")

Height with Grid: 13.5 mm (0.53")

Height without Grid: 12.6 mm (0.50")

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

a. Individually calibrated

b. 149 dB (152 dB peak) with ±15 V supply



Compliance with EMC Directive

Ordering Information

Type 4191 ½" Free-field Microphone

Includes the following accessories:

• BC-0226: Calibration Chart^c

• BC-5002: Microphone Mini-CD^c

TEDS COMBINATIONS

4191-B-001 ½" Free-field Microphone with Preamplifier Type 2669-B

4191-C-001 ½" Free-field Microphone with

Preamplifier Type 2669-C

4191-L-001 ½" Free-field Microphone with

Preamplifier Type 2669-L

OPTIONAL ACCESSORIES

Type 2669 ½" Microphone Preamplifier

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 Angle Piece (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

4191-CAI Accredited Initial Calibration

4191-CAF Accredited Calibration

4191-CFF Factory Standard Calibration

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

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

HEADQUARTERS: DK-2850 Nærum · Denmark · Telephone: +45 4580 0500
Fax: +45 4580 1405 · www.bksv.com · info@bksv.com

Australia (+61) 2 9889-8888 · Austria (+43) 1 865 74 00 · Brazil (+55) 11 5188-8161
Canada (+1) 514 695-8225 · China (+86) 10 680 29906 · Czech Republic (+420) 2 6702 1100
Finland (+358) 9-755 950 · France (+33) 1 69 90 71 00 · Germany (+49) 421 17 87 0
Hong Kong (+852) 2548 7486 · Hungary (+36) 1 215 83 05 · Ireland (+353) 1 807 4083
Italy (+39) 0257 68061 · Japan (+81) 3 5715 1612 · Republic of Korea (+82) 2 3473 0605
Netherlands (+31) 318 55 9290 · Norway (+47) 66 77 11 55 · Poland (+48) 22 816 75 56
Portugal (+351) 21 4169 040 · Singapore (+65) 6377 4512 · Slovak Republic (+421) 25 443 0701
Spain (+34) 91 659 0820 · Sweden (+46) 33 225 622 · Switzerland (+41) 44 8807 035
Taiwan (+886) 2 2502 7255 · United Kingdom (+44) 14 38 739 000 · USA (+1) 800 332 2040

Local representatives and service organisations worldwide

Brüel & Kjær

