

# PRODUCT DATA

## 1/2" Free-field Microphone — Type 4190

Type 4190 is designed for high-precision free-field measurements where a microphone with high sensitivity is required. Being external polarized type 4190 must be used with classical preamplifier.



080144

### 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: 200 V

### Use of Free-field Microphones

At higher frequencies, reflections and diffractions cause 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.

Type 4190 is not only suited for use in class 1 Sound Level Meters but also for all high-precision acoustic measurements where a robust and stable, externally polarized 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 4190 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 4190 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 4190 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 P 1451.4 but TEDS to IEEE 1451.4 is available on request.

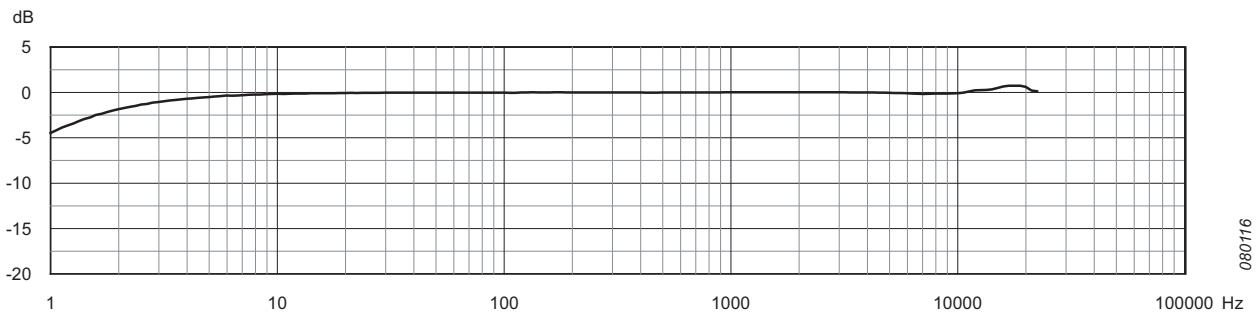
### Individual Calibration Data

Each Type 4190 comes with an individual calibration chart including information about the open-circuit sensitivity, 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



## Specifications – ½" Free-field Microphone Type 4190 (valid from serial number 2495487)

**IEC 61094–4 Type Designation:** WS2F  
**Polarization Voltage:** 200 V (external)  
**Open-circuit Sensitivity (250 Hz)<sup>a</sup>:**  
 50 mV/Pa, -26 dB ±1.5 dB re 1 V/Pa  
**0° Incidence Free Field Response<sup>a</sup>:**  
 5 Hz to 10 kHz: ±1 dB  
 3.15 Hz to 20 kHz ±2 dB  
**Lower Limiting Frequency (–3 dB)<sup>a</sup>:**  
 1 to 2 Hz  
**Pressure Equalization Vent:** Rear vented  
**Diaphragm Resonance Frequency:**  
 14 kHz (90° phase shift)  
**Cartridge Capacitance (Polarized)<sup>a</sup>:**  
 16 pF at 250 Hz  
**Equivalent Air Volume:** 46 mm<sup>3</sup> (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):** >148 dB SPL<sup>b</sup>  
**Max. Sound Pressure Level:** 159 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):**  
 –0.012 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<sup>2</sup> axial vibration



**Magnetic Field Sensitivity:**  
 4 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:** 17.6 mm (0.69")  
**Height without Grid:** 16.3 mm (0.64")

**Thread for Pre-amplifier 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

  Compliance with EMC Directive

a. Individually calibrated

b. 140 dB (peak) with ± 15V supply

## Ordering Information

Type 4190 ½" Free-field Microphone  
 Includes the following accessories:  
 • BC-0225: Calibration Chart<sup>c</sup>  
 • BC-5002: Microphone Mini-CD<sup>c</sup>

### TEDS COMBINATIONS

4190-B-001 ½" Free-field Microphone with Pre-amplifier Type 2669-B  
 4190-C-001 ½" Free-field Microphone with Pre-amplifier Type 2669-C

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

4190-L-001 ½" Free-field Microphone with Pre-amplifier Type 2669-L

### OPTIONAL ACCESSORIES

Type 2669 ½" Microphone Pre-amplifier  
 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 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

4190-CAI Accredited Initial Calibration  
 4190-CAF Accredited Calibration  
 4190-CFF Factory Standard Calibration

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

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