

PRODUCT DATA

Brüel & Kjær® Acoustic Transducers

¼-inch Pressure-field TEDS Microphone Type 4988-A

Microphone Type 4988-A is designed to be used in small closed couplers, close to hard reflective surfaces, close to sound ports of audio devices or in flush mountings. The microphone has an all-titanium design which ensures maximum resistance to corrosion and minimum sensitivity to magnetic fields. It has a very small variance from sample to sample and is virtually unaffected by temperature and humidity changes, making it the ideal microphone for integration in production test systems.



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Uses

- Measurements requiring an EN/IEC 61326 EMC compliant product
- Measurements very close to sound ports of an audio device (near field)
- Measurements in small acoustic chambers and test boxes where reflections occur
- Measurements in unpredictable sound field conditions
- Flush mounting
- Production tests systems
- Inside an acoustic coupler (pressure field)
- Reference microphone for tuning of microphone arrays and active noise-cancelling systems

Manufacturing and Stability

Type 4988-A has an all-titanium design, which ensures maximum resistance to corrosion and minimum sensitivity to magnetic fields. The laser-welded diaphragm results in superior robustness and long-term stability.

All Brüel & Kjær measurement microphones are assembled in a clean room to guarantee that the microphones maintain their high stability and low inherent noise characteristics even when used in humid and/or high-temperature environments.

The minimal variation from microphone to microphone and the well-defined phase response makes this microphone well suited as a reference microphone for tuning of microphone arrays and active noise-cancelling systems.

When used in a pressure-field environment, like a coupler for measurement of earbuds and headphones, there is no risk of blocking the vent as Type 4988-A is rear-vented through the preamplifier.

Features

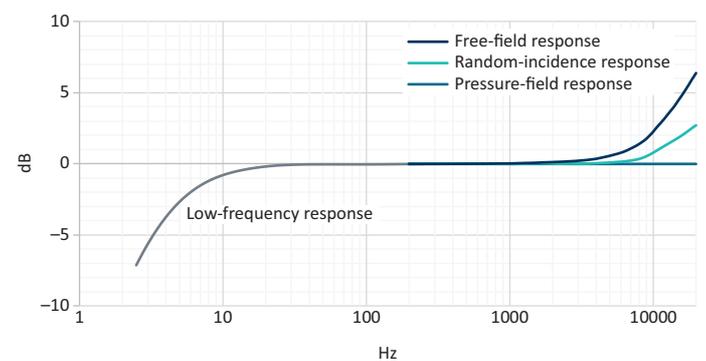
- All-titanium construction (Grade 2)
- Sensitivity: 11 mV/Pa
- Frequency range: 20 Hz to 20 kHz, ±1 dB
- Dynamic range: 29 to 146 dB(A)
- Minimal frequency response variance from sample to sample
- Well-defined phase response
- Connects directly to CCLD* input
- Transducer electronic data sheet (TEDS)

* CCLD: Constant current line drive, also known as DeltaTron® and IEPE

Frequency Response

Type 4988-A is optimized for pressure-field measurements. Fig. 1 shows its typical frequency response in different sound fields. The differences between the responses only appear at higher frequencies.

Fig. 1 Typical frequency response of Type 4988-A



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TEDS Microphone

Type 4988-A is a TEDS microphone. A ¼-inch pre-polarized microphone cartridge and a high-quality CCLD preamplifier are welded into one unit to prevent contamination and ensure the validity of the TEDS data.

Microphone Data

Each Microphone Type 4988-A comes with an individual data set containing the electrostatic actuator calibration data at 1/12-octave frequencies, plus a wealth of technical information such as the influence of different accessories, corrections at different angles of incidence in a free field, corrections in a diffuse field and much more. Using the data set and REq-X, a real-time correction feature for different measurement situations in PULSE™ LabShop, can further improve measurement accuracy or make the microphone suitable to be used in other sound fields.

Furthermore, our online Calibration Cloud allows you to download your calibration data at any time – see more at www.bksv.com/Service/CalibrationCloud.

Compliance with Standards

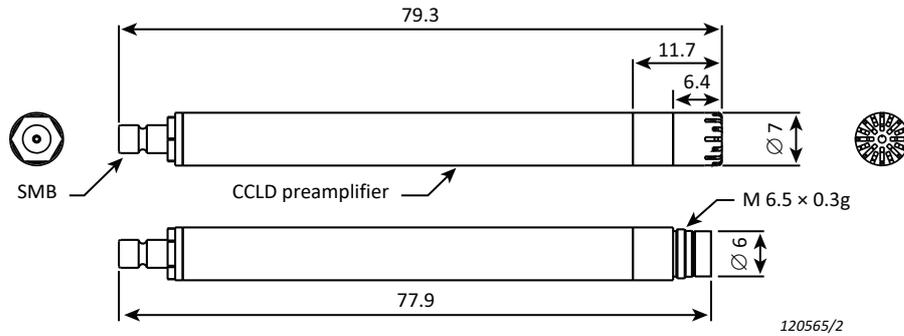
   	<p>The CE marking is the manufacturer's declaration that the product meets the requirements of the applicable EU directives</p> <p>RCM mark indicates compliance with applicable ACMA technical standards – that is, for telecommunications, radio communications, EMC and EME</p> <p>China RoHS mark indicates compliance with administrative measures on the control of pollution caused by electronic information products according to the Ministry of Information Industries of the People's Republic of China</p> <p>WEEE mark indicates compliance with the EU WEEE Directive</p>
Safety	<p>EN/IEC 61010 – 1: Safety requirements for electrical equipment for measurement, control and laboratory use</p> <p>ANSI/UL 61010 – 1: Safety requirements for electrical equipment for measurement, control and laboratory use</p>
EMC Emission	<p>EN/IEC 61000 – 6 – 3: Generic emission standard for residential, commercial and light industrial environments</p> <p>EN/IEC 61000 – 6 – 4: Generic emission standard for industrial environments</p> <p>CISPR 32: Radio disturbance characteristics of information technology equipment. Class B Limits</p> <p>FCC Rules, Part 15: Complies with the limits for a Class B digital device</p> <p>This ISM device complies with Canadian ICES – 001 (standard for interference-causing equipment)</p>
EMC Immunity	<p>EN/IEC 61000 – 6 – 1: Generic standards – Immunity for residential, commercial and light industrial environments</p> <p>EN/IEC 61000 – 6 – 2: Generic standards – Immunity for industrial environments</p> <p>EN/IEC 61326: Electrical equipment for measurement, control and laboratory use – EMC requirements</p> <p>Note: The above is only guaranteed using accessories listed in this product data</p>
Temperature	<p>IEC 60068 – 2 – 1 & IEC 60068 – 2 – 2: Environmental Testing. Cold and Dry Heat</p> <p>Storage Temperature: –25 to +70 °C (–4 to +158 °F)</p>
Mechanical	<p>Non-operating:</p> <p>IEC 60068 – 2 – 29: Bump: 1000 bumps at 400 m/s²</p>

GENERAL SPECIFICATIONS		
IEC 61094-4 Type Designation	None	
Sensitivity (250 Hz)*	-39 dB +2/-4 dB (re 1 V/Pa), 11 mV/Pa	
Pressure-field Response	20 Hz to 20 kHz, ±1 dB	
Phase Spread (95% of the population is within)	±0.5° up to 1 kHz	
	±2° up to 5 kHz	
	±4° up to 10 kHz	
	±10° up to 20 kHz	
Lower Limiting Frequency (-3dB)	<6 Hz	
Pressure Equalization Vent	Rear-vented (through preamplifier)	
Calibrator Load Volume	70 mm ³	
Pistonphone Correction	0.00 dB	
Inherent Noise	Typical 29 dB(A)	
Upper Limit of Dynamic Range (3% Distortion)	146 dB	
Power Requirements	CCLD supply 24 to 28 V	
Power Supply	Nominally	4 mA, 22 to 28 V (unloaded supply voltage)
	Full specs with 10 m (32.8 ft) cable	3.5 – 20 mA, 22 – 28 V (unloaded supply voltage)
	With reduced specifications	Minimum 2 mA, 18 V
Output Bias Voltage	12 ± 2 V at -20 to 50 °C 12 ± 4 V up to 70 °C	
Output Voltage	>7 V (peak)	
Maximum Output Current	Peak value 2.3 mA below supply current	
Output Impedance	<15 Ω	
TEDS Template	IEEE 1451.4 V1.0	
ENVIRONMENTAL SPECIFICATIONS		
Operating Temperature Range	-20 to +80 °C (-4 to +176 °F)	
Storage Temperature	In Microphone Box	-20 to +70 °C (-4 to +158 °F)
	With Mini-CD	5 to 50 °C (41 to 122 °F)
Temperature Coefficient (250 Hz)	+0.015 dB/°C typical	
Static Pressure Coefficient	-0.0015 dB/kPa typical	
Operating Humidity Range	0 to 100% RH (without condensation)	
Influence of Humidity	Unmeasurable in the absence of condensation	
Vibration Sensitivity (< 1000 Hz)	62 dB equivalent SPL for 1m/s ² axial vibration (typical)	
Magnetic Field Sensitivity	No detectable influence from a 50 A/m, 50 Hz magnetic field	
Estimated Long-term Stability	<1 dB in 1 year (air at 50 °C (122 °F), 90% RH)	
PHYSICAL SPECIFICATIONS		
Material	Titanium Grade 2	
Diameter with Grid	7 mm (0.275 in)	
Length with Grid	79 mm (3.1 in) with socket	
Socket	SMB	

* Individually calibrated

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

Fig. 1 Physical dimensions (in mm) of Type 4988-A (microphone cartridge and preamplifier)



Ordering Information

Type 4988-A ¼-inch Pressure-field TEDS Microphone

Includes the following accessories:

- Calibration chart*
- Microphone data

* Quote microphone serial number if reordering

Optional Accessories

CABLING

- AO-0563 Cable, SMB (right angle) to SMB (right angle)
- AO-0564 Cable, SMB (right angle) to BNC
- AO-0587 Cable, SMB (straight) to BNC

CALIBRATION

- Type 4231 Sound Calibrator
- Type 4228 Pistonphone
- Type 4226 Multifunction Acoustic Calibrator
- DP-0775 Calibration Adaptor, ¼-inch microphones
- UA-0033 Electrostatic Actuator, ½-inch microphones
- DB-4121 Adaptor, ¼-inch microphones, use with UA-0033

GENERAL ACCESSORIES

- WQ-1099 Spherical Windscreen, diameter 65 mm (2.6 in)
- WQ-1133 Elliptical Windscreen, 38 × 55 mm (1.5 × 2.2 in)
- UA-2129 Microphone Holder, built-in SMB connector

Related Services

MAINTENANCE

- MIC-TEDS-EW1 Extended Warranty, one year for TEDS microphones

ACCREDITED CALIBRATION

- MIC-TEDS-CAI Initial Accredited Calibration, microphone with preamplifier and programming of TEDS
- MIC-TEDS-CAF Accredited Calibration, microphone with preamplifier and programming of TEDS