PRODUCT DATA

¼″ 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 and Features

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

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

Description

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.

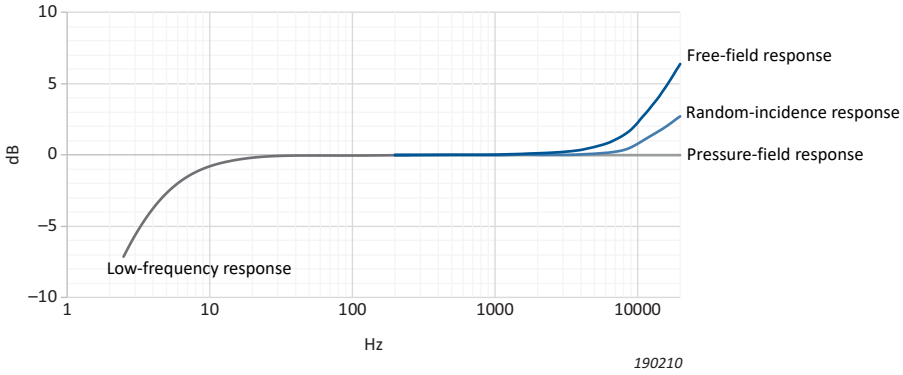
TEDS Microphone

Type 4988-A is a TEDS microphone. A ¼″ 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.

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



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

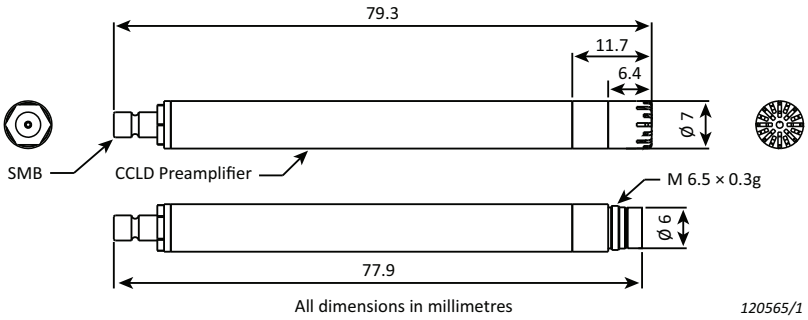
CE RCM China RoHS WEEE	The CE marking is the manufacturer's declaration that the product meets the requirements of the applicable EU directives RCM mark indicates compliance with applicable ACMA technical standards – that is, for telecommunications, radio communications, EMC and EME China RoHS mark indicates 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 WEEE mark indicates compliance with the EU WEEE Directive
Safety	EN/IEC 61010−1: Safety requirements for electrical equipment for measurement, control and laboratory use ANSI/UL 61010−1: Safety requirements for electrical equipment for measurement, control and laboratory use
EMC Emission	EN/IEC 61000−6−3: Generic emission standard for residential, commercial and light industrial environments EN/IEC 61000−6−4: Generic emission standard for industrial environments CISPR 22: Radio disturbance characteristics of information technology equipment. Class B Limits FCC Rules, Part 15: Complies with the limits for a Class B digital device This ISM device complies with Canadian ICES−001 (standard for interference-causing equipment)
EMC Immunity	EN/IEC 61000−6−1: Generic standards – Immunity for residential, commercial and light industrial environments EN/IEC 61000−6−2: Generic standards – Immunity for industrial environments EN/IEC 61326: Electrical equipment for measurement, control and laboratory use – EMC requirements **Note:** The above is only guaranteed using accessories listed in this product data
Temperature	IEC 60068−2−1 & IEC 60068−2−2: Environmental Testing. Cold and Dry Heat Storage Temperature: –20 to +70 °C (–4 to +158 °F)
Humidity	IEC 60068−2−78: Damp Heat: 0 to 93% RH (non-condensing) storage
Mechanical	Non-operating: IEC 60068−2−6: Vibration: 0.3 mm, 20 m/s^2, 10 – 500 Hz IEC 60068−2−27: Shock: 1000 m/s^2 IEC 60068−2−29: Bump: 1000 bumps at 250 m/s^2
Enclosure	IEC 60529: Protection provided by enclosures: IP 20

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/s2 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″)
Length with Grid		79 mm (3.1″) 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. 2 *Physical dimensions of Type 4988-A (microphone cartridge and preamplifier)*



Ordering Information

Type 4988-A ¼″ Pressure-field TEDS Microphone

Includes the following accessories:

- Calibration Chart*
- Microphone Data Set

Optional Brüel & Kjær 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″ microphones
UA-0033	Electrostatic Actuator, ½″ microphones
DB-4121	Adaptor, ¼″ microphones, use with UA-0033

GENERAL ACCESSORIES

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

Brüel & Kjær 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

Visit www.bksv.com/Service/Calibration-and-verification to find more information about calibration services online.

Calibration contracts with up to 5 years coverage including Extended Warranty and other benefits are available. Visit www.bksv.com/calibration-plus to learn more.

* Quote microphone serial number if reordering

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