

BRÜEL & KJÆR® Transducers

½-inch CCLD Pressure-field Microphone Type 4971-H-041

Microphone Type 4971-H-041 is designed to be used close to hard reflective surfaces, close to sound ports of audio devices, or in flush mountings. It is designed to be accurate, reliable and robust.



200081

Uses and Features

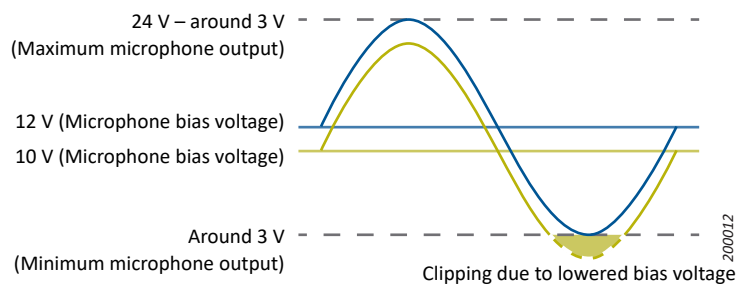
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| <p>Uses</p> <ul style="list-style-type: none"> • Measurements very close to sound ports of an audio device (near field) • Measurements in acoustic chambers and test boxes where reflections occur • Flush mounting • Inside an acoustic coupler (pressure field) • Acoustic measurements requiring a robust and reliable ½-inch pressure-field microphone operating at temperatures up to 125 °C (257 °F) • Free-field measurements with 90° incidence | <p>Features</p> <ul style="list-style-type: none"> • IEC 61094-4/WS2P (cartridge) • Operating temperature range: –20 to +125 °C • Dynamic Range: 20 dB(A) to 146 dB • Sensitivity: 12 mV/Pa, –38.3 dB • Frequency range: 5 Hz to 20 kHz • Connects directly to CCLD input • Transducer electronic data sheet (TEDS) • No measurable influence of humidity in the absence of condensation |
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Description

Type 4971-H-041 is the combination of ½-inch Prepolarized Pressure-field Microphone Cartridge Type 4971 and ½-inch CCLD High-temperature Microphone Preamplifier Type 1706. Type 4971 is designed for high-precision coupler measurements or noise measurements according to ANSI/IEC standards, and when combined with Type 1706, can be used in high temperature (125 °C) environments with cost-effective cables.

Bias Voltage

Fig. 1
Change in the bias voltage
reduces the dynamic range
of a microphone



CCLD* microphones operate on a constant current power supply and give output signals in the form of voltage modulation on the power supply line. For Brüel&Kjær microphone preamplifiers, the power supply line is designed as 12 V DC to give maximal voltage swing and is normally called bias voltage.

Changes in bias voltage lower the possible voltage swing. The consequence is that the microphone preamplifier will overload at a lower SPL, as illustrated in Fig. 1, thereby reducing the dynamic range. For this reason, the bias voltage of a CCLD microphone is a key factor of microphone dynamic range.

Brüel&Kjær microphone preamplifiers are so well-designed and manufactured that the bias voltage stays stable through changes in humidity and temperature, ensuring that there is minimal change to the dynamic range of the instrument over the course of a measurement.

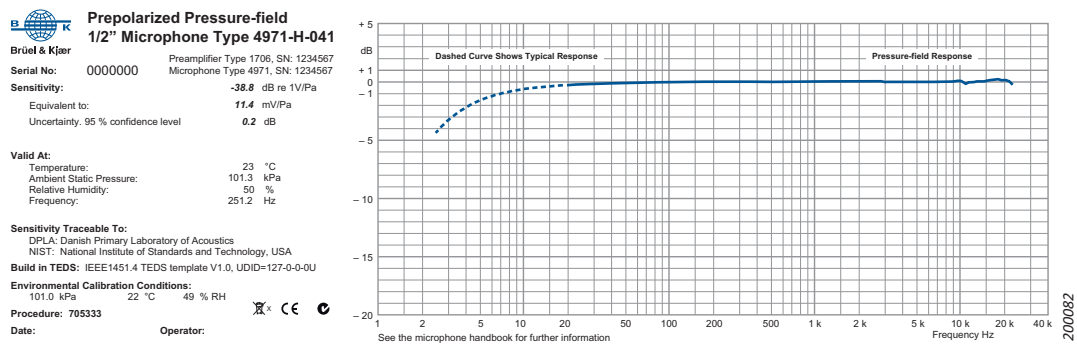
* Constant current line drive, also known as DeltaTron® (ICP and IEPE compatible)

Type 4971-H-041 is equipped with TEDS (transducer electronic data sheet). TEDS microphones are assembled and sealed in a clean environment and are considered one unit, with a single type and serial number. Each TEDS is programmed with the loaded sensitivity of the actual cartridge and with the microphone's unique identity, including its type and serial number. Thereby, microphone information is readily available when using TEDS-compatible data acquisition and analysis systems.

TEDS Template Versions

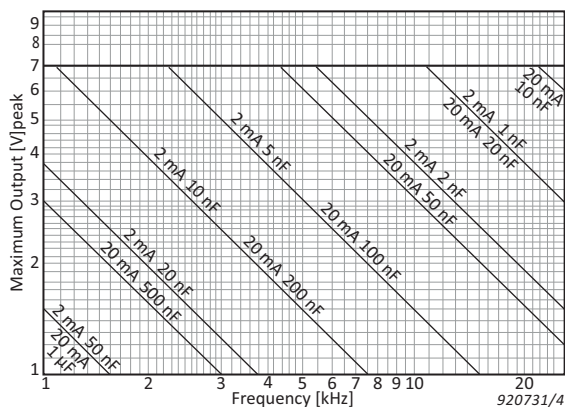
The default TEDS template used in Type 4971-H-041 is IEEE 1451.4 version 0.9, but IEEE P1451.4 version 1.0 is available on request.

Fig. 2
Example of a calibration chart. A TEDS includes information given in the chart



Cable Length

Fig. 3
Typical curves for maximum output level of CCLD microphones, showing maximum capacitive load over the recommended current supply range



Cable length is limited by the available output current of the preamplifier, especially in situations where high-frequency signals must be measured at high levels. Typical cable capacitance is 100 pF/m.

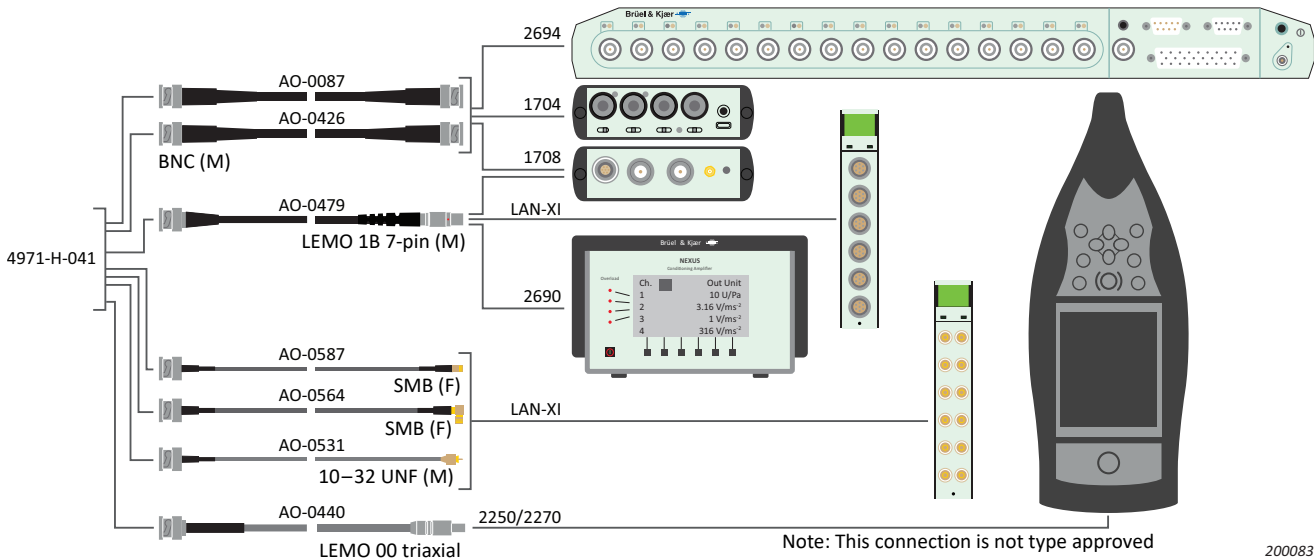
When using Type 4971-H-041, the typical maximum output level of the microphone is limited by cable capacitance or current supply range. Typical limitations are shown in Fig. 3.

Cable Length and TEDS

TEDS will normally work with cables up to 100 m (328 ft).

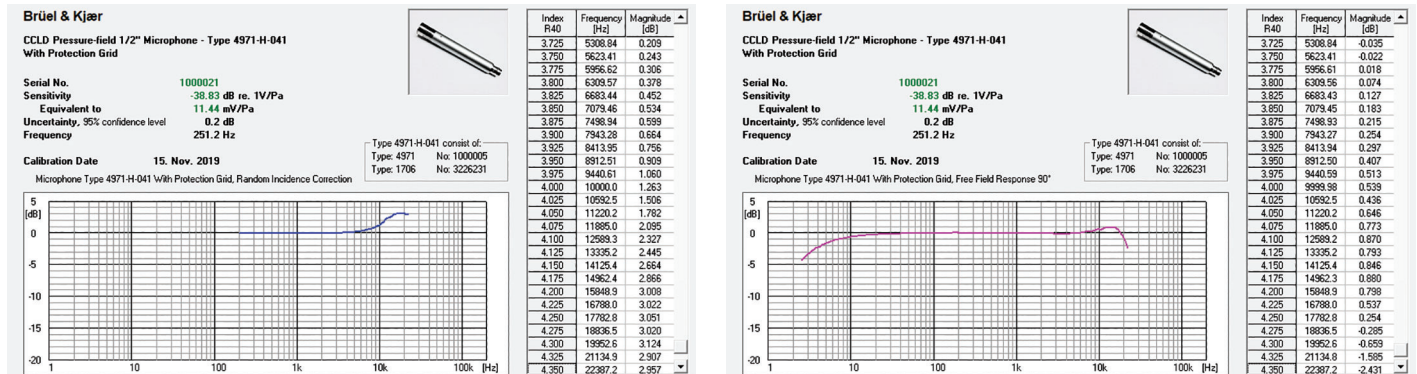
Configuration Examples

Fig. 4 Cables for connecting Type 4971-H-041 to conditioning and data acquisition hardware



The microphone is supplied with Brüel&Kjær Microphone Viewer, an application which you can install on your PC. The application contains frequency correction curves for different conditions and other useful information, such as the influence of different accessories on the frequency response. The correction data can be uploaded to PULSE LabShop or BK Connect®, where it can be used to correct the frequency response in real time according to the actual conditions during use, or exported as a Microsoft® Excel® file for use in applications such as MATLAB®. This data is also available online.





Fig. 5 Brüel&Kjær Microphone Viewer: view graphs of the frequency response and correction of Type 4971-H-041 under different conditions, such as random incidence correction, with protection grid (left) and free-field response, 90° incidence with protection grid (right)



Service and Support

HBK local and global service and support teams, and certified calibration centres are another guarantee of the quality of Brüel&Kjær microphones.

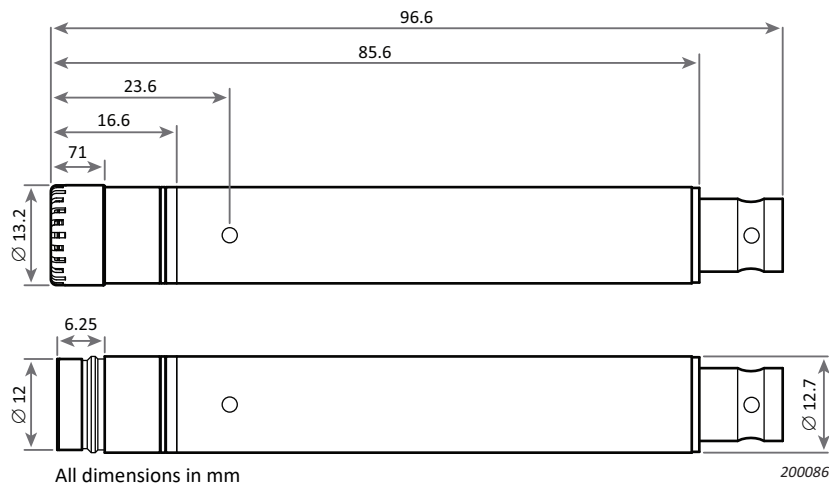
Compliance with Standards

   	<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 document</p>
Temperature	<p>IEC 60068-2-1 & IEC 60068-2-2: Environmental Testing. Cold and Dry Heat</p> <p>Operating Temperature: -20 to +125 °C (-4 to +257 °F)</p> <p>Storage Temperature: -20 to +70 °C (-13 to +150 °F)</p>
Humidity	<p>IEC 60068-2-78: Damp Heat: 0 to 93% RH (non-condensing) storage</p> <p>93% RH (non-condensing at 40 °C (104 °F))</p>
Mechanical	<p>Non-operating:</p> <p>IEC 60068-2-6: Vibration: 0.3 mm, 20 m/s², 10 – 500 Hz</p> <p>IEC 60068-2-27: Shock: 1000 m/s²</p> <p>IEC 60068-2-29: Bump: 1000 bumps at 250 m/s²</p>

GENERAL SPECIFICATIONS		
Pressure-field Response (± 1 dB)		20 Hz to 20 kHz
Cartridge Pressure-field Response (± 1 dB)		10 Hz to 20 kHz
Cartridge Lower Limiting Frequency (± 3 dB)		1 to 3 Hz
Dynamic Range Inherent noise to 3% distortion in operating temperature range		20 dB(A) to 146 dB
Cartridge Thermal Noise		18.6 dB(A), 20.9 dB(Lin)
Max Sound Pressure Level		169 dB(peak)
Pressure Equalization Vent		Rear-vented (through preamplifier)
Sensitivity (250 Hz)	Type 4971 (cartridge only)	12.5 mV/Pa, -38 dB ± 1.5 dB (re 1 V/Pa)
	Type 4971-H-041	12 mV/Pa, -38.3 dB (re 1 V/Pa)
Pistonphone Connection		0.02 dB
IEC 61094-4 Compliance		WS2P (Type 4971)
ELECTRONIC SPECIFICATIONS		
Supply Voltage		CCLD supply, 24 to 28 V
Supply Current	Nominally	4 mA, 22 to 28 V (unloaded supply voltage)
	Full specifications with 10 m (32.8 ft) cable	3.5 to 20 mA, 22 to 28 V (unloaded supply voltage)
	With reduced specifications	Minimum 2 mA, 18 V
Output Bias Voltage (within operating temperature range)		12 ± 2 V
Output Voltage		>7 V (peak)
Maximum Output Current		Peak value 2.3 mA below supply current
Start-up Time (for signal within 0.1 dB)		<60 s
Output Impedance		<50 Ω
TEDS Template Version Number		1.0 (IEEE 1451.4)
TEDS Template ID		UDID = I27-0-0-0U
Charge Injection Calibration (CIC)		NO
ENVIRONMENTAL SPECIFICATIONS		
Operating Temperature Range		-20 to $+125$ $^{\circ}\text{C}$ (-4 to $+257$ $^{\circ}\text{F}$)
Storage Temperature	In microphone box	-20 to $+70$ $^{\circ}\text{C}$ (-4 to $+158$ $^{\circ}\text{F}$)
	With mini CD	5 to 50 $^{\circ}\text{C}$ (41 to 122 $^{\circ}\text{F}$)
Temperature Coefficient (250Hz)		$+0.003$ dB/K (-10 to $+50$ $^{\circ}\text{C}$ (14 to 122 $^{\circ}\text{F}$))
Pressure Coefficient		-0.0023 dB/kPa, typical
Operating Humidity Range Without condensation at 40 $^{\circ}\text{C}$ (104 $^{\circ}\text{F}$)		0 to 93% RH
Influence of Humidity		Not measurable in the absence of condensation
Vibration Sensitivity (<1000 Hz)		65.5 dB equivalent SPL for 1 m/s^2 axial vibration
CE Compliant (including RoHS2)		Yes
PHYSICAL SPECIFICATIONS		
Diameter with Grid		13.2 mm (.52 in)
Length with Grid		96.6 mm (3.8 in) with socket
Socket		BNC

All values are typical at 23 $^{\circ}\text{C}$ (73.4 $^{\circ}\text{F}$), 101.3 kPa and 50% RH unless otherwise specified

DIMENSIONS



Ordering Information

Type 4971-H-041 ½-inch CCLD Pressure-field Microphone

Includes:

- Calibration chart
- Microphone mini CD

Optional Accessories

CABLING

AO-0087	Single-screened coaxial cable, BNC (M) to BNC (M)
AO-0426	Double-screened coaxial cable, BNC (M) to BNC (M)
AO-0479	Microphone cable, BNC (M) to LEMO 1B 7-pin (M)
AO-0587	Single-screened coaxial cable, SMB (F) to BNC (M)
AO-0564	Single-screened coaxial cable, right-angle SMB (F) to BNC (M)
AO-0531	Single-screened coaxial cable, 10–32 UNF (M) to BNC (M)
AO-0440	Triaxial cable, LEMO 00 triaxial (M) to BNC (M)

CALIBRATION

Type 4231	Sound Calibrator
Type 4228	Pistonphone
Type 4226	Multifunction Acoustic Calibrator
UA-0033	Electrostatic Actuator, ½-inch microphones
DP-0776	Calibration Adapter, ½-inch microphones

WINDSCREENS

UA-0459	Spherical Windscreen, diameter 65 mm (2.56 in)
UA-0237	Spherical Windscreen, diameter 90 mm (3.54 in)

Service Products

MAINTENANCE

MIC-TEDS-EW1	Extended Warranty, one year for TEDS Microphones
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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.

