

½" Condenser Microphone Cartridge Types 4192-S and 4192-T for Calibration Systems

Type 4192-S is designed for use as a laboratory standard microphone.

Type 4192-T is designed for use as a transfer standard microphone.



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Uses and Features

Uses

- Working standard microphone
- Laboratory standard microphone
- Pressure and free field reciprocity calibrations
- Coupler measurements

Features

- Frequency: 3.15 Hz - 20 kHz
- Polarization: 200 V
- Standards:
 - Type 4192-T: IEC 61094-4 WS2P
 - Type 4192-S: IEC 61094-1 LS2P

About the Microphones

Type 4192-S* is suitable for reciprocity calibrations, secondary comparison calibrations (full frequency range), and ear simulator calibrations according to international standard IEC 60318-1.

Type 4192-T is a pressure-field microphone. It is optimized to be a working standard microphone for secondary calibration systems up to 10 kHz.

Each Type 4192-S and 4192-T is delivered with Brüel & Kjær's factory standard calibration. In addition, we offer an accredited calibration service for both types.

Polarization Voltage

Types 4192-S and 4192-T require an external polarization voltage and, therefore, must be used with a classical preamplifier. Externally polarized microphones may be used at higher temperatures without severe changes in sensitivity.

Supported Preamplifiers

Brüel & Kjær preamplifiers Types 2669 and 2673 may be used with these microphones. Type 2673 has a Insert Calibration facility for condenser microphone calibration using the insert voltage technique.

* There is no long-term document to support the stability, therefore, it is not promised that Type 4192-S has the same stability as laboratory standard microphone Type 4180.

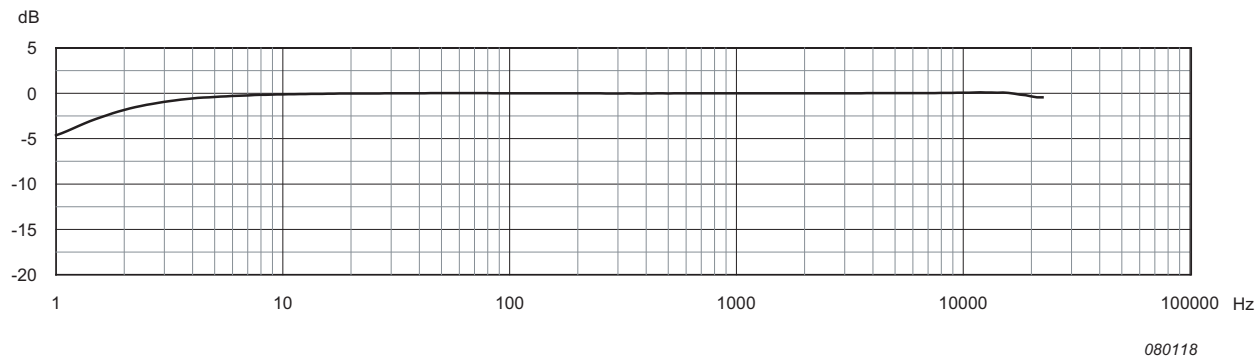
Environmental Parameter Influence

For accurate calibration of microphones in the full frequency range, it is necessary to know the influence of temperature and static pressure changes at all frequencies. The information is available in Brüel & Kjær’s [Microphone Handbook](#) for Falcon™ range microphones, and a more detailed analysis of Type 4192 is described in our Technical Review No. 1 2001*.

Corrections for Type 4192 are included in the software delivered with Brüel & Kjær’s Reciprocity Calibration System Type 9699.

* Go to our online [Knowledge Centre](#) and log in to view the technical review, as well as browse through our extensive library.

Fig. 1 Typical pressure-field frequency response of the microphone 4192-T



Calibration as a Laboratory Standard Microphone

All accredited calibration of microphones provided by BKSVDPLA† using Type 4192-S are listed in the table below. Various independent calibration services are also available.

Please note, a calibration system using Type 4192-S will not have the same uncertainty as laboratory standard microphone Type 4180, as the position of the cavity ring may not be identical due to mounting and dismounting. To ensure the performance, finger-strength is recommended to use when mounting and dismounting the microphone’s cavity ring.

† Danish Primary Laboratory of Acoustics, a designated institute participating in the CIPM MRA

Table 1 Type 4192-S microphone calibration services available through Brüel & Kjær

Item No.	Calibration Frequency Series*	Calibration Specification
ET 2012	A	125, 250, 500, 1000, 2000 Hz
ET 2013	B	Octave frequencies between 31.5 Hz and the highest frequency stated for the type of microphone
ET 2014	C	Same as series B but with 1/3-octave frequencies above 1 kHz
ET 2014-W-002	E	1/3-octave from 10 Hz to 20 kHz
ET 2030	F	1/12-octave from 20 Hz to 25 kHz
ET 2015	D	Individual selected frequency. Only in addition to series A, B, C, E and F
ET 2016	Length of front cavity	This type of calibration is necessary to perform the above calibrations within the specified uncertainties. It does not need to be performed as frequently as sensitivity calibrations. The proposed interval is 5 years

* The generally applied calibration frequencies are nominal frequencies. The exact frequencies are in accordance with ISO 266 and equal to $10^{n/10}$ Hz, where n is an integer.

Specifications – ½" Condenser Microphone Cartridge Types 4192-S and 4192-T

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



	Unit	Type 4192-S	Type 4192-T
Standard			
IEC 61094-4 Type Designation		LS2P	WS2P
General			
Polarization Voltage	V	200 external	
Open-circuit Sensitivity (250 Hz)*	mV/Pa	12.5, –38 dB ±1.5 dB re 1 V/Pa	
Lower Limiting Frequency (–3 dB)*	Hz	1 to 2	
Diaphragm Resonance Frequency (90° phase shift)	kHz	23	
Cartridge Capacitance at 250 Hz (polarized)*	pF	18	
Equivalent Air Volume at 250 Hz	mm ³	9.3	8.8
Pistonphone Correction (Type 4228 with DP-0776)	dB	0.08	0.02
Cartridge Thermal Noise	dB	19 dB(A), 21.3 dB(Lin)	
Upper Limit of Dynamic Range (3% Distortion)	dB	>162 dB SPL 149 dB (152 dB peak) with ±15 V supply	
Max. Sound Pressure Level	dB	171 dB (peak)	
Environmental Characteristics			
Operating Temperature Range	°C (°F)	–30 to +150 (–22 to +302) Usable up to 300 °C (572 °F) with a permanent sensitivity change of approx. 0.4 dB, which stabilises after one hour	
Storage Temperature	°C (°F)	In microphone box: –30 to +70 (–22 to +158)	
Temperature Coefficient (250 Hz)	dB/K	–0.0045 (–10 to +50 °C/+14 to 122 °F)	
Pressure Coefficient	dB/kPa	–0.005, typical	
Operating Humidity Range	RH	0 to 100% (without condensation)	
Influence of Humidity	dB	<0.1 in the absence of condensation	
Vibration Sensitivity (<1000 Hz)	dB equivalent SPL	65.5 for 1 m/s ² axial vibration	
Magnetic Field Sensitivity	dB SPL	16 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)	
Physical Characteristics of Cartridge			
Pressure Equalization Vent		Side vented	Front vented
		Side vented without cavity rig	Side vented without protection grid
Diameter	mm (in)	13.2 (0.52)	13.2 (0.52)
		12.7 (0.50) without cavity rig	12.7 (0.50) without protection grid
Height	mm (in)	13.1 (0.52)	13.5 (0.53)
		12.6 (0.50) without cavity rig	12.6 (0.50) without protection grid
Thread for Preamplifier Mounting		11.7 mm-60 UNS	

* Individually calibrated

Type 4192-S ½" Condenser Microphone Cartridge

includes the following accessories:

- Calibration Chart
- UA-4116: Cavity Ring
- DZ-9314: Dust Cap

OPTIONAL ACCESSORIES

Type 4228	Pistonphone
DP-0776	Calibration Adapter for ½" microphones
UA-4116	Cavity Ring for Type 4192-S
DB-3421	Protection Grid for Type 4192-T
Type 2669	½" Microphone Preamplifier
Type 2673	½" Microphone Preamplifier with insert voltage calibration (IVC) facility

Type 4192-T ½" Condenser Microphone Cartridge

includes the following accessories:

- Calibration Chart
- DB-3421: Protection Grid

CALIBRATION

For Type 4192-T:

MIC-CAI	Initial Accredited Calibration
MIC-CAF	Accredited Calibration

For Type 4192-S:

See Table 1 for information

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