PRODUCT DATA

Signal Conditioner Type 1708

Single-channel, battery powered for classical and CCLD input

Type 1708 provides signal conditioning, amplification and gain control for Brüel & Kjær classical microphones as well as CCLD transducers. It is designed for easy use, both in the field and in the lab, featuring a built-in rechargeable battery optimized for in situ measurements.*

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Uses

- Condition signals by applying gains and filters
- Provide reliable power to:
  - Classical microphone assemblies, prepolarized or polarized
  - CCLD transducers

Features

- ±60 V supply covers the maximum dynamic range of all classical microphones and preamplifiers
- 8 mA supply for compatibility with all CCLD transducers
- Charge injection calibration (CIC) via an external generator
- Built-in Li-Ion battery, provides up to 9 h of operating time for classical microphones (up to 15 h for CCLD)
- 5 V DC adaptor for powering/charging via mains
- Power cable with USB connector for powering/charging via computer
- Wide range of gains (×0.1, ×1, ×10 and ×100) to amplify analog signal before external digital conversion, improving noise floor
- Linear, 22.4 Hz to 22.4 kHz, and A-weighting (type 0) filters for removing unwanted frequencies
- Easy-to-use switches for changing settings quickly, LED displays for quick verification of status

Description

Type 1708 is a single-channel signal conditioner for classical microphone/preamplifier combinations as well as CCLD transducers.

Located on the front panel are the power switch (with battery check), setting selectors (power supply, filter and gain) and the LED status displays (battery and overload).

The input connectors (LEMO for classical microphones, BNC for CCLD and/or direct), a BNC output connector, an SMB connector for CIC, and a coaxial connector for powering/charging the battery are located on the back panel.

Fig. 1 ***Left:*** *Front panel* ***Right:*** *Back panel*

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* CCLD: Constant current line drive

Transducer Power Supply

For powering both classical and CCLD transducers, there are two power supply options: polarization voltage (V_{pol}) or CCLD. Polarization voltage can be set to either 0 or 200 V, and CCLD provides an 8 mA constant current.

CCLD power has many manufacturer-specific names such as DeltaTron®, ICP® (Integrated Circuit Piezoelectric), IEPE (Integrate Electronics Piezoelectric) and ISOTRON®. Type 1708 is compatible with transducers using any of the above trade names.

Gain and Filtering

Type 1708 includes analog gain and filtering. Adding a gain before converting the signal from analog to digital can improve the system's noise floor. Likewise, selecting a filter can remove unwanted frequencies before conversion.

Type 1708 Gain Settings:

×0.1 (–20 dB), ×1 (0 dB), ×10 (+20 dB), ×100 (+40 dB)

Type 1708 Filters:

Linear, 22.4 Hz to 22.4 kHz, A-weighting (type 0)

Fig. 2 Mains power adaptor ZG-0473 includes plug adaptor set and attached power cable AO-1429 with coaxial to USB connectors

Type 1708 Powering Options

Type 1708 features a DC coaxial (EIAJ-02) connector for powering/charging the built-in battery using either the provided mains power adaptor or a computer's USB port.*

The rechargeable battery has at least 500 cycles, each lasting for about 9 hours of operation (depending on the settings), which is more convenient than replacing non-rechargeable batteries and reduces the cost of ownership.

Family of Brüel & Kjær Signal Conditioners

Table 1 Feature comparison of Brüel & Kjær signal conditioners

	1708	1704-A	2690-A	2829	5935-L
Mains (AC) Power	✓	✓	✓	✓	✓
USB Power	✓	✓			
Battery Power	✓	✓	Optional		✓
Number of Channels per Unit	1	1 or 2	1 to 4	4	2
Manual Control	✓	✓	✓		✓
Computer Control			✓		
Read Transducer Electronic Data Sheet (TEDS)			✓	Via external connector	
Uni (Fine) Gain Adjustment			✓		✓
Multiplexer Output			✓	✓	✓
Maximum Frequency (kHz, at filters –5% point)	>350	55	100	–	100
Maximum Gain (dB)	40	40	80	–	50
Minimum Gain (dB)	–20	0	–20	0	0
A-weighting (type 0)	✓	✓	✓		✓
Single and Double Integration Filters			✓	✓	✓
Constant Current Supply (mA)	✓	✓	✓	✓	✓

* Please note, powering from the USB port of a computer, or the mains power adaptor, can generate noise.

Compliance with Standards

Type 1708 is designed for use in systems with cable length <30 m.

	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:** Effect of radiated RF, 80 – 1000 MHz 80% AM 1 kHz 10 V/m: <300 µV. **Note:** The above is only guaranteed using accessories listed in this document.
Temperature	IEC 60068-2-1 & IEC 60068-2-2: Environmental Testing. Cold and Dry Heat. Operating Temperature: – 20 to +50 °C (–4 to +122 °F). Storage Temperature: – 25 to +70 °C (–13 to +158 °F).
Humidity	IEC 60068 – 2 – 78: Damp Heat: 93% RH (non-condensing at 40 °C (104 °F)).
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.

Specifications – Type 1708

CONNECTORS
Input:
- Classical: LEMO
- CCLD: BNC

Output: BNC
External Generator: SMB
Battery Power Supply: Coaxial EIAJ-02

BATTERY
Number of battery charging cycles (down to 80%): 500
Time to charge (in OFF mode), mains (AC) or USB: 5 hours

PHYSICAL
Dimensions: 110 × 140 × 36 mm (4.33 × 5.51 × 1.42 in)
Weight: 320 g (11.29 oz)

Temperature Range:
- Operating: –20 to +50 °C (–4 to +122 °F)
- Charging: 10 to 40 °C (50 to 104 °F)

FILTERING AND GAIN
Filters:
- Linear
- 22.4 Hz to 22.4 kHz
- A-weighting

Gain:
- ×0.1 (–20 dB)
- ×1 (0 dB)
- ×10 (+20 dB)
- ×100 (+40 dB)

		UNIT	GAIN			
			×0.1 (–20 DB)	**×1 (0 DB)**	**×10 (+20 DB)**	**×100 (+40 DB)**
Amplifier Gain	**at 1 kHz**	dB	–20 ± 0.05	0 ± 0.05	20 ± 0.05	40 ± 0.05
Gain Tolerance	**10 Hz 100 kHz**	dB	±0.2	±0.1	±0.1	±0.2
Excitation Voltage	**Classical**	V	±60	±15	±15	±15
	CCLD	V		25	25	25
Excitation Current	**CCLD**	mA	8 ± 2			
Maximum Input Voltage (peak)		V	±58	±10	±0.1	±0.010
Input Protection*		V	From ±58	–14.5 to +25	–14.5 to +25	–14.5 to +25
Maximum Non-destructive Input		V	±100	±100	±100	±100
Maximum Output Voltage (peak)		V	6	10	10	10
Overload Level		V	±55	±11	±1.1	±0.11
Output Impedance		Ω	50	50	50	50
Cable Fault Voltage Levels	**CCLD overload levels**		%, CCLD current disconnected	Input voltage below +2.5 V: cable short-circuited Input voltage above +21 V: open circuit		
Total Harmonic Distortion	**at 1 kHz 1 V_{rmsout}**	dB	>70, Typ.: 80	>80, Typ.: 90	>80, Typ.: 90	>80, Typ.: 90
Output DC Offset		mV	Max.: 3.5, Typ.: 1	Max.: 3.5, Typ.: 1	Max.: 3.5, Typ.: 1	Max.: 3.5, Typ.: 1
Charge Injection Calibration (CIC)†			Yes	Yes	Yes	Yes

		UNIT	GAIN			
			×0.1 (–20 DB)	×1 (0 DB)	×10 (+20 DB)	×100 (+40 DB)
Frequency Range (–3 dB, max. slew rate 10 V/µs)	Lower Limit	Hz	<1, Typ.: 0.7	<1, Typ.: 0.7	<1, Typ.: 0.7	<1, Typ.: 0.7
	Upper Limit	kHz	>450	>450	>450	>350
Spectral Output Noise, Linear‡	1 Hz	µV/√Hz	<0.2, Typ.: 0.07	<0.2, Typ.: 0.06	<1.5, Typ.: 0.3	<10, Typ.: 3
	10 Hz		<0.2, Typ.: 0.05	<0.1, Typ.: 0.02	<0.5, Typ.: 0.1	<5, Typ.: 1
	100 Hz		<0.07, Typ.: 0.04	<0.05, Typ.: 0.01	<0.15, Typ.: 0.07	<1.5, Typ.: 0.7
	1 kHz		<0.07, Typ.: 0.035	<0.02, Typ.: 0.01	<0.15, Typ.: 0.07	<1.5, Typ.: 0.7
	10 kHz		<0.02, Typ.: 0.013	<0.02, Typ.: 0.01	<0.15, Typ.: 0.07	<1.5, Typ.: 0.7
	100 kHz		<0.02, Typ.: 0.013	<0.02, Typ.: 0.01	<0.15, Typ.: 0.07	<1.5, Typ.: 0.7
	150 kHz**		<0.02, Typ.: 0.013	<0.02, Typ.: 0.01	<0.15, Typ.: 0.07	<1.5, Typ.: 0.7
Broadband Electrical Output Noise, Linear‡	1 Hz to 10 kHz	μV_{rms}	<4, Typ.: 2.5	<3, Typ.: 1.2	<8, Typ.: 6.7	<70, Typ.: 63
	1 Hz to 100 kHz		<6, Typ.: 4	<5, Typ.: 3.5	<25, Typ.: 22	<250, Typ.: 200
	1 Hz to 150 kHz**		<7.5, Typ.: 5	<6.5, Typ.: 4.5	<32, Typ.: 28	<320, Typ.: 250
Broadband Output Noise‡	Acoustic Bandpass, Linear	μV_{rms}	<4, Typ.: 2.6	<3, Typ.: 1.6	<12, Typ.: 10	<100, Typ.: 94
	Acoustic Bandpass, Internal		<8, Typ.: 6.5	<8, Typ.: 6	<15, Typ.: 12	<110, Typ.: 95
	A-weighting, Post-processing		<4, Typ.: 2.4	<3, Typ.: 1.4	<10, Typ.: 7.6	<80, Typ.: 73
	A-weighting, Internal		<10, Typ.: 7	<10, Typ.: 7	<12, Typ.: 10	<80, Typ.: 74
Phase Difference, Device to device (typ. values), Linear weighting (without filters)	100 kHz		±5°	±5°	±10°	±15°
	1 Hz		±2°	±2°	±2.5°	±2.5°
Max. Amplitude Difference, Device to device, Linear weighting (without filters)	100 kHz	dB	±0.4	±0.1	±0.2	±0.5
	1 Hz		±0.15	±0.1	±0.15	±0.11
Battery Life (Typical)	CCLD mode	h	15	15	15	15
	With Preamplifier Type 2669 (±15 V supply)			9.5	9.5	9.5
	With Preamplifier Type 2669 (±60 V supply)		4			
	After low-battery level	min	30	45	45	45

* If the signal input level exceeds the measuring range significantly, the input will go into protection mode for 0.5 s. Overload will be detected, input impedance will be increased and the signal attenuated. Input signal is cut when it exceeds ±60 V.
† It is possible to calibrate the input of preamplifier using charge injection by connecting an external generator via the SMB connector. During CIC, the CIC switch and the overload diode must be set to 'On'. When not in use, CIC switch must be 'Off'.
‡ Powering from the USB port of a computer, or the mains power adaptor, can generate noise. All noise specifications apply to measurements using battery power.
** Power supply switching frequency: between 170 and 180 kHz

Ordering Information

Type 1708 Signal Conditioner

ACCESSORIES

ZG-0473 Power supply wall adaptor, 5 V
AO-1429 Power cable, DC

CALIBRATION SERVICES

1708-CVI Initial Accredited Calibration, Type 1708 with microphone
1708-CVF Accredited Calibration, Type 1708 with microphone

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