PRODUCT DATA

Battery-powered CCLD Signal Conditioners: Type 1704-A-001, one-channel, and Type 1704-A-002, two-channel

Type 1704-A is a range of CCLD conditioner/amplifiers designed for field and lab use. It includes features like a built-in, rechargeable battery optimised for in situ measurements.

They provide signal conditioning, amplification and gain for CCLD compatible:

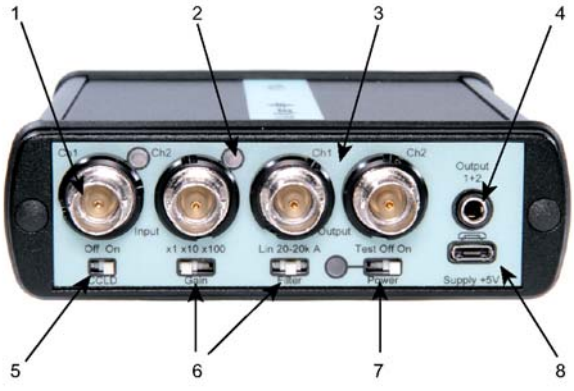
- *Accelerometers*
- *Charge Accelerometers (using Type 2647 Inline charge amplifier)*
- *Microphones*
- *Tacho Probes*

Uses and Features

- Provides power for microphones, accelerometers and other CCLD-compatible transducers
- Industry standard CCLD power is compatible with wide range of DeltaTron® and ICP® sensors
- Built-in Li-Ion battery and charger – ready to measure when you are
- Powered and charged from PC's USB connector (with optional cable): no need for an extra mains adaptor
- Wide range of gains (×1, ×10 and ×100) amplify signal before A/D to improve noise floor
- Selectable acoustic bandpass and A-weighting (type 0) filters remove unwanted frequencies
- Switches to quickly change settings and LEDs for fast verification of configuration
- Both 2 × BNC and 3.5 mm stereo output connectors provide options to connect to A/D converters or sound cards

Description

Fig. 1 *Connectors, switches and LEDs on Type 1704-A-002:*
1) CCLD power for accelerometers, microphones and tacho probes;
2) LED overload and CCLD cable fault detection;
3) BNC outputs for connection to instrumentation;
4) 3.5 mm stereo socket for soundcard connection;
5) CCLD On/Off – can be used without CCLD power as voltage amplifier and filter;
6) Gain and filters to improve dynamic range;
7) 13 hours of battery life;
8) USB Micro-B for powering and charging



The Type 1704-A range of conditioners provides CCLD (Constant Current Line Drive) power for CCLD transducers such as microphones, accelerometers, and tachometer probes. Type 1704-A-001 is a one-channel version while Type 1702-A-002 is a two-channel version.

CCLD power is a de facto standard in the dynamic test and measurement world and has many manufacturer specific names such as DeltaTron®, ICP® (Integrated Circuit Piezoelectric), IEPE (Integrate Electronics Piezoelectric) and ISOTRON®. Type 1704 CCLD signal conditioners are compatible with transducers using any of the above trade names.

CCLD conditioning has advantages because it allows the transducer power to be delivered using the same coaxial cable that the transducer uses to return the measurement signal. This reduces cabling costs and improves noise immunity compared to multi-conductor cables.

Connectors

The Type 1704-A range of conditioners have all their connectors, switches and status LEDs located on the front of the unit (see Fig. 1).

Flexible Powering Options

Type 1704-A uses a Micro-B USB connector for power and charging the built-in rechargeable battery. Power comes from either the provided mains adaptor or from a powered USB port of a computer using the optional USB cable. A quick glance at the front of Type 1704-A confirms status and settings when making measurements in the field.

The built-in rechargeable battery is not only more convenient than replacing non-rechargeable batteries but also makes for a lower cost of ownership. The rechargeable battery has at least 500 cycles, each lasting for 15 hours (Type 1704-A-001) or 13 hours (Type 1704-A-002)

Gain and Filtering

Type 1704 includes analogue gain and filtering. Available gains settings include ×1 (0 dB), ×10 (+20 dB) and ×100 (+40 dB). Adding gain before the analogue to digital conversion can improve the system's noise floor. Likewise, the selectable acoustic band-pass filter can remove unwanted frequencies before the analogue to digital conversion. An A-weighting type 0 filter is also selectable.

Accessories

Fig. 2
Type 1704-A includes ZG-0863 for powering and charging from the mains

Fig. 3
Optional accessories include Soft Carrying Case KE-0463 and Cable AO-1494 to power and charge direct from a PC's USB connector

Brüel & Kjær's Family of CCLD DeltaTron Signal Conditioners

Type 1704-A is part of a larger family of CCLD DeltaTron signal conditioners. From small, battery- or USB-powered units to large, computer-controlled systems, Brüel & Kjær has a unit to fit your needs.

Table1 *Features of Brüel & Kjær's Family of CCLD DeltaTron Signal Conditioners*

	1704-A	1704-C-102	WB-1453	2693 DeltaTron NEXUS	2694-A
Mains (AC) Power	✓	✓	–	✓	✓
USB Power	✓	✓	–	–	–
Battery Power	✓	–	✓	Optional	–
Number Channels per Unit	1 or 2	2	3	1 – 4	16
Manual Control	✓	✓	N/A	✓	–
Computer Control	–	–	–	✓	✓
Read Transducer's Electronic Datasheet (TEDS)	–	–	–	✓	✓
Uni (Fine) Gain Adjustment	–	–	–	✓	–
Multiplexer Output	–	–	–	–	✓
Maximum Number Channels from one PC	–	–	–	99 per COM or USB port	256 per COM or USB port
Maximum Frequency (kHz at filters –5% point)	55	55	25	100 (–10%)	50 (–10%)
Minimum Frequency (Hz at filters –5% point)	2.2	2.2	0.1	0.1 (–10%)	0.1 (–10%)
Maximum Gain	× 100 (40 dB)	× 100 (40 dB)	× 1 (0 dB)	× 10000 (80 dB)	× 100 (40 dB)
Minimum Gain	× 1 (0 dB)	× 1 (0 dB)	× 1 (0 dB)	× 0.1 (–20 dB)	× 0.316 (–10 dB)
A-weighting (type 0)	✓	–	–	✓	Optional
Single and Double Integration Filters	–	–	–	Optional	Optional
Constant Current Supply (mA)	3 – 4.1	3 – 4.1	3	4 or 10	6

Compliance with Standards

CE C-Tick	CE-mark indicates compliance with EMC Directive and Low Voltage Directive C-Tick mark indicates compliance with the EMC requirements of Australia and New Zealand
Safety	EN/IEC 61010–1 and 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 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
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 Ambient Operating Temperature: –10 to +50°C (14 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: 0.3mm, 20ms^{-2}, 10 – 500Hz IEC 60068–2–27: Shock: 1000ms^{-2} IEC 60068–2–29: Bump: 1000 bumps at: 400ms^{-2}
Enclosure	IEC 60529: Protection provided by enclosures: IP 20
RoHS	RoHS compliant

Specifications – Type 1704-A

		Gain ×1 (0 dB)	Gain ×10 (+20 dB)	Gain ×100 (+40 dB)
Input Connector	Channel 1 and 2*	BNC		
Output Connector	Channel 1 and 2*	BNC or 3.5 mm stereo plug		
Amplifier Gain		0 dB (×1), 20 dB (×10); 40 dB (×100)		
Gain Tolerance		± 1%		
Excitation Voltage		22 V ± 2 V (typ. 21 V)		
Excitation Current		3 to 4.1 mA (nom. 3.55 mA)		
Maximum Input Voltage (peak)		± 10 V		
Input Protection		35 V_p (non-destructive)		
Maximum Output Voltage (peak)		± 10 V		
Output Impedance		50 Ω		
Cable Fault Voltage Levels		2.5 V and 18 V		
Total Harmonic Distortion		< 90 dB (0.003%) @ 1 kHz 1 V_{rms}		
DC Offset		< 5 mV		
Frequency Range (–5%)		2.2 Hz to 55 kHz	2.2 Hz to 55 kHz	2.2 Hz to 55 kHz
Frequency Range (–3 dB)		0.8 Hz to 100kHz	0.8 Hz to 100 kHz	0.8 Hz to 75 kHz
Filters		Linear (none), Acoustic Bandpass, A-weighting (type 0)		
Acoustic Bandpass Filters	60 dB/decade	22.4 Hz to 22.4 kHz (–3 dB)		
Spectral Output Noise Lin. (μV/√Hz)	(1 Hz)	< 0.2	< 1.5	< 15
	(10 Hz)	< 0.05	< 0.3	< 3
	(100 Hz)	< 0.025	< 0.15	< 0.8
	(1 kHz)	< 0.025	< 0.15	< 0.8
	(10 kHz)	< 0.025	< 0.15	< 0.8
	(100 kHz)	< 0.025	< 0.15	< 0.8
Broadband Electrical Output Noise, Lin. (μV_{rms})	(1 Hz to 10 kHz)	2	12	70
	(1 Hz to 100 kHz)	11	75	210 (50 kHz)
Broadband Output Noise (μV_{rms})	in Acoustic Bandpass (Lin.)	2.5	18	100
	with internal Acoustic Bandpass filter	13	22	100
	post-processed A-weighting	1.75	13	75
	with internal A-weighting filter	14	20	75
Crosstalk (dB)*	CCLD Powered Enabled, Linear filter	–115	–105	–91
	Direct (CCLD Off), Linear filter	–125	–105	–100
Battery Life (hours)	Type 1704-A-001 (1704-A-002)	15 (13)		
	after low battery level	1		
Number of Battery Charging Cycles		500		
Time to Charge (hours)	Mains (AC) or USB Can charge while using	6 (4 if charge only)		
Size		125 × 110 × 35 mm (4.9 × 4.3 × 1.4″)		
Weight		326 g (11.5 oz.)		
Temperature Range (operating)		–10 to +50°C (14 to 122°F)		
Temperature Range (charging)		0 to 50°C (32 to 122°F)		

* Type 1704-A-002 only

POWER SUPPLY

Internal Battery: Built-in Li-ion battery typically providing 15 hours (Type 1704-A-001) or 13 hours (Type 1704-A-002) of continuous use. Charging time is approximately 6 hours

Mains Supply: Supported by Power Supply ZG-0863 (included). 90 – 264 V AC, 40 – 65 Hz. Includes adaptors for US, UK, Europe and Australia/New Zealand

Ordering Information

Type 1704-A-001 1-channel Battery-powered CCLD Signal Conditioner and Type 1704-A-002 2-channel Battery-powered CCLD Signal Conditioner include the following accessories

- ZG-0863 Power Supply, 90 – 264 V AC, 1.5 m Cable with micro-USB-B

OPTIONAL ACCESSORIES

AO-1494 Cable, USB-A (M) to USB-B (M), 1.8 m
KE-0463 Soft Carrying Case
Type 2647-A/B/C/D Charge to CCLD Converters for measuring with charge accelerometers

TRADEMARKS

DeltaTron is a registered trademark of Brüel & Kjær Sound & Vibration Measurement A/S · ICP is a registered trademark of PCB Piezotronics Inc. · ISOTRON is a registered trademarks of ENDEVCO Corporation

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