

PRODUCT DATA

Production Test USB DAQ Type 3670

Type 3670 is a data acquisition system (DAQ), specifically designed to be used with CCLD* measurement transducers, that digitizes and streams data through a USB interface to computers running either macOS® or Windows® operating systems.

Input channels provide conditioning for the transducers, are synchronized and support sampling frequencies up to 96 kHz. This provides a usable analogue input frequency range of 5 Hz to 40 kHz.

Output channels are synchronized in pairs and DC-coupled with a frequency range from DC to 40 kHz. The output channels are designed to be able to drive low-impedance loads like small speakers, headphones, etc.

Type 3670 is available in two variants:

- 8-channel input, 2-channel output, Type 3670-A-082
- Licensed 8-channel input, 2-channel output, Type 3670-A-082-R, which functions as the front end for Electroacoustic Engine BZ-7852)

All variants can be mounted in 19" rack systems with the included rack mounting kit.

Uses and Features

Uses

- Real-time, multichannel sound and vibration data acquisition
- CCLD power supply for transducers
- Audio and vibration quality control (QC) of components or sub-assemblies
- Final assembly, test and pack (FATP) stations for finished products

Features

- Instrumentation-grade acquisition system
- Analogue input and output channels
- 24-bit ADC and DAC
- 150 mW output channels
- Streaming via CoreAudio for macOS or audio stream input/output (ASIO®)† for Windows
- Wide frequency bandwidth
- Single input voltage range covering full dynamic range
- Information-only front panel
- No controls on rear panel
- Internal CCLD switch (on/off) on each input channel
- Rugged and light
- IP 50 – dust protected
- Silent operation (convective cooling)
- Programming examples available via GITHUB®

* CCLD: Constant current line drive, also known as DeltaTron (IEPE compatible)
† ASIO is a trademark and software of Steinberg Media Technologies GmbH



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General Description

The instrument-quality design of Type 3670 provides exceptional accuracy and fidelity for all acquired or generated signals. The 110 dB dynamic range allows resolution of signals that differ in amplitude by a ratio of one million to one.

Microcontroller

Type 3670 has an embedded microcontroller with built-in 24-bit analogue-to-digital converters (ADC) for the input channels and built-in 24-bit digital-to-analogue converters (DAC) for the output channels. The microcontroller performs all the necessary housekeeping of the ADC, DAC and industry-standard USB 2.0 interface, freeing the host PC to give maximum responsiveness to your application.

Fig. 1 Rear of Type 3670-A-082 with eight input channels and two output channels



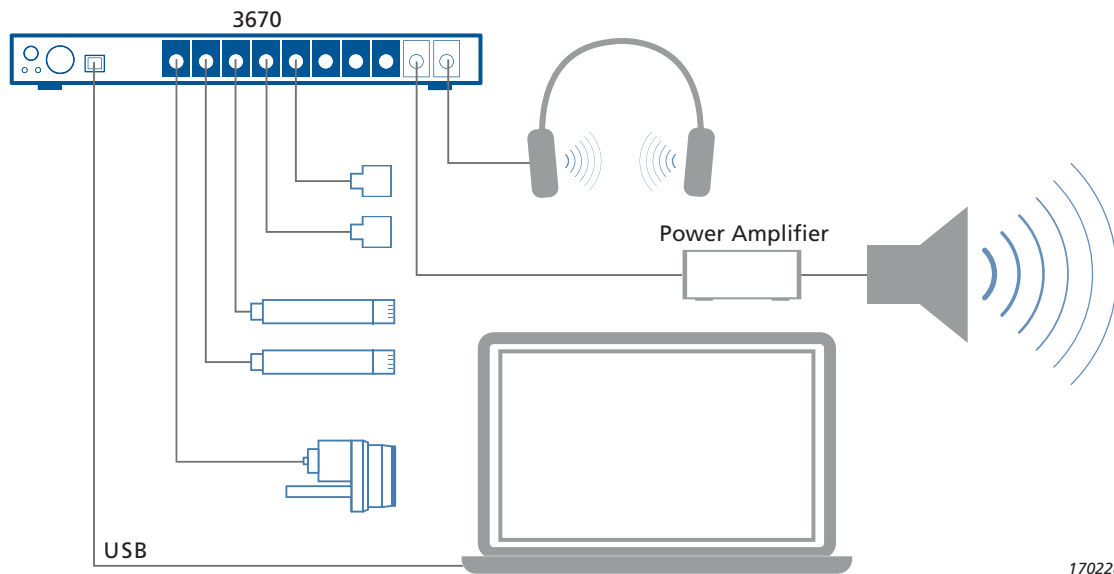
Input Channels

All input channels have both analogue and digital filters, providing alias protection for the 96 kHz sampling frequency and ensuring data integrity. They have a single voltage range from 5 μ V to 5 V peak that, when combined with the 24-bit resolution, provides the extremely low noise floor often required for acoustic measurements. Moreover, the range supports the full portfolio of Brüel & Kjær CCLD transducers making multiple input ranges unnecessary. This simplifies set up and avoids overload and under-range errors when measuring.

Output Channels

Output channels are synchronized in pairs. The output channel amplifiers are DC coupled and have a very low output impedance, allowing them to directly drive up to 150 mW into low-impedance loads like mini-speakers and headphones.

Fig. 2 Type 3670 supports CCLD accelerometers, microphones and ear simulators, drives devices such as headphones or loudspeakers (with amplification), and streams data via USB



Included with the DAQ

Each Type 3670 is delivered with a USB key (BZ-5089) that contains: installation instructions, audio drivers, a USB audio tool that allows use of Type 3670 without programming, factory calibration information, a readme file with links to GitHub (for programming examples), and this product data for specification references.

The USB key may also include Electroacoustic Engine Software BZ-7852. BZ-7852 is delivered together with Type 3670-A-082-R as well as with Type 3670-UPG. BZ-7852 can only be used in combination with a Type 3670 DAQ with a built-in license.

The Variants

Type 3670- A-082

This is the standard version of the Production Test USB DAQ interfacing directly with your PC streaming data via CoreAudio for macOS or audio stream input/output (ASIO®) for Windows.

Type 3670-A-082-R

Type 3670-A-082-R includes a built-in license for Electroacoustic Engine Software BZ-7852.


BZ-7852 is an electroacoustic test environment that drives Type 3670 to simplify the measurement of accurate acoustic

and vibration measurements in a production test environment. It can generate final test measurements for further analysis and evaluation without the need for waveform generation, hardware control or digital signal processing programming experience.

Type 3670-UPG

Type 3670-UPG is an upgrade service that allows an existing Type 3670-A-082 DAQ to be upgraded with a built-in license for the Electroacoustic Engine. The upgrade can be performed at selected HBK Service Centres and includes the BZ-7852 software.

Compliance with Standards

	<p>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 in Australia.</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	EN/IEC 61010-1:2010: Safety requirements for electrical equipment for measurement, control and laboratory use
EMC Emission	<p>EN/IEC 61000-6-3: Generic standards – Emission standard for residential, commercial and light-industrial environments.</p> <p>EN/IEC 61000-6-4: Generic standards – Emission standard for industrial environments.</p> <p>EN 61326-1: Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements. Class B.</p> <p>FCC Rules, Part 15: Complies with the limits for a Class B digital device</p>
EMC Immunity	<p>EN/IEC61000-6-1: Generic standards – Immunity for residential, commercial and light industrial environments.</p> <p>EN 61326-1: Electrical equipment for measurement, control and laboratory use – EMC requirements. Basic electromagnetic environment.</p> <p>Note: The above is only guaranteed using accessories listed in this document.</p>
Temperature	IEC 60068-2-1 & IEC 60068-2-2: Environmental Testing. Cold and Dry Heat Storage Temperature: – 40 to +70 °C (– 40 to 158 °F)
Humidity	IEC 60068-2-78: Damp Heat: 93% RH (non-condensing at 40 °C (104 °F))
Mechanical	<p>Non-operating:</p> <p>IEC 60068-2-6: Vibration: 0.3 mm, 20 m/s² (2 g), 10 – 500 Hz</p> <p>IEC 60068-2-27: Shock: 1000 m/s² (100 g)</p> <p>IEC 60068-2-29: Bump: 1000 bumps at 250 m/s² (25 g)</p>

EFFECT OF RADIATED AND CONDUCTED RF

Radiated RF	80 – 1000 MHz	80% AM 1 kHz, 10 V/m
	1000 – 2700 MHz	80% AM 1 kHz, 3 V/m
Conducted RF	0.15 – 80 MHz,	80% AM 1 kHz, 3 V

INPUT	RADIATED RF	CONDUCTED RF
CCLD INPUT	<25 µV	<25 µV
OUTPUT	<25 µV	<25 µV

ASIO COMPATIBLE



Input Channels

Frequency Range	5 Hz to 40 kHz	
Sampling Rate	96 kHz	
AD Converter	24 bit	
DC Offset	<10 μ V typical	
Data Transfer	24 bit	
Input Voltage Range	$\pm 5 V_{peak}$	
Input Signal Coupling	AC, Single-ended, Grounded to chassis	
Input Impedance	>100 k Ω < 300 pF	
Maximum Input	$\pm 15 V_{peak}$	
High-pass filter	5 Hz (-3 dB)	
Amplitude Precision	1 kHz, 1 V_{input} : < ± 0.1 dB	
Amplitude Conversion	5.3 V at input channel results in digital fs on USB interface	
Amplitude Linearity (Below full scale)	0 to 80 dB	± 0.05 dB
	80 to 100 dB	± 0.15 dB
Frequency Response (re. 1 kHz)	± 0.2 dB, 5 Hz to 40 kHz	
Noise (Termination: < 50 Ω)	20 Hz to 20 kHz	15 μ V (67 nV/ \sqrt{Hz})
	20 Hz to 40 kHz	18 μ V (69 nV/ \sqrt{Hz})
Spurious-free Dynamic Range (Termination: < 50 Ω)	110 dB re. full-scale input	
Harmonic Distortion THD (10)	1 V_{rms} at 1 kHz	≤ -90 dB (0.003%)
	At certain freq./levels	Down to -82 dB
Crosstalk	-80 dB	
Channel-to-channel Match	Amplitude	5 Hz to 40 kHz: 0.2 dB
	Phase	5 Hz to 40 kHz: 1°
Input to Output Latency*	512 bytes	30 ± 0.1 ms
	4096 bytes	90 ± 0.02 ms
Output to Input Latency*	512 bytes	16 ± 0.07 ms
	4096 bytes	89 ± 0.07 ms
Supply for CCLD	24 V source: More than 4 mA	

* Values given are with Brüel & Kjær's USB 2.0 Audio Interface UL-0098 version 4.47.0 and are subject to change with driver type and version.

Output Channels

Frequency Range	DC to 40 kHz	
Sampling Rate	96 kHz	
DA Converter	24 bit	
DC Offset	<1 mV, typical 0.3 mV	
Data Transfer	USB	
Output Range	load > 600 Ω	$\pm 3.5 V_{peak}$
	load < 600 Ω	$\pm 250 mA_{peak}$
Output Signal Coupling	DC, Single-ended, Grounded to chassis	
Output Impedance	100 m Ω <300 pF	
Output Load	> 4 Ω	
Maximum Output Power (at 1 kHz)	1 kHz into 32 Ω	>150 mW
	1 kHz into 4 Ω	100 mW
Amplitude Conversion	Digital fs on USB interface results in 3.5 V at the output channel	
Amplitude Linearity (below full scale)	0 to 90 dB	± 0.05 dB
	90 to 120 dB	± 0.1 dB
Frequency Response (re 1 kHz)	DC to 30 kHz	± 0.1 dB
	DC to 40 kHz	± 0.5 dB
Noise (Termination: <50 Ω)	20 to 20 kHz	10 μ V (30 nV/ \sqrt{Hz})
	20 to 40 kHz	26 μ V (115 nV/ \sqrt{Hz})
Harmonic Distortion THD (10), at 1 kHz	100 mW	1 kHz into $\geq 32 \Omega$: < -80 dB (0.01%)
		1 kHz into $\geq 600 \Omega$: < -90 dB (0.003%)
	10 mW	1 kHz into $\geq 32 \Omega$: < -90 dB
		1 kHz into $\geq 32 \Omega$: < -90 dB
Crosstalk	-100 dB	
Channel-to-channel Phase Match		
Channel matching: Ch. 1 to Ch. 2 Not applicable to other channel combinations	40 kHz	0.5°
	30 kHz	0.3°
Latency	Constant for a given buffer-size, for example: I/O loop delay (latency): 2700 samples @ 96 kHz sampling rate, block size 1024 samples, safe mode	
Protection	Short-circuit, over-current, over-heating, ramp-down on power off	

Physical Specifications

Power Status LED	Green	Power present
Status LED	Green	USB communication active
	Red	USB not connected/ communication lost
Input Connector		8 × BNC
Output Connector		2 × BNC
USB Connector		USB 2.0 High-speed, Type B (F)
Power	DC Input	10 to 32 V DC, external regulated
	Consumption	<6 W
Size (w × d × h)		345 × 170 × 43 mm (13.6 × 6.7 × 1.7")
Weight		1.0 kg (2.2 lb)

Host Computer

Operating System		macOS
		Windows 10
USB		USB 2.0 High-speed, Type A (F)
Driver	macOS	Core Audio
	Windows	ASIO (included [†])
Sampling Rate [†]		96, 48, 24 and 12 kHz

[†] The anti-aliasing filters are optimized for 96 kHz sampling. Aliasing can occur if using sampling rates lower than 96 kHz

Ordering Information

Type 3670-A-082 Production Test USB DAQ, 8/2-ch. (8-channel input, 2-channel output)

Includes the following:

- AO-0728-D-020: Cable, USB 2.0, Type A (M) to Type B (M), 2.0 m (6.6 ft)
- ZG-0448: Power Supply (100 to 240 V AC to 12 V DC/1.0 A) with plug adaptors (AU, EU, GB, US)
- UA-1764: Rack mounting kit
- BZ-5089: ASIO driver on USB key

Type 3670-A-082-R Production Test USB DAQ, 8/2-ch. with Electroacoustic Engine and License

Includes the following:

- AO-0728-D-020: Cable, USB 2.0, Type A (M) to Type B (M), 2.0 m (6.6 ft)
- ZG-0448: Power Supply (100 to 240 V AC to 12 V DC/1.0 A) with plug adaptors (AU, EU, GB, US)
- UA-1764: Rack mounting kit
- BZ-5089: ASIO driver on USB key
- BZ-7852: Electroacoustic Engine Software (included on BZ-5089)
- Built-in license to operate BZ-7852

ELECTROACOUSTIC ENGINE UPGRADE/UPDATE

Type 3670—UPG Upgrade of Type 3670-A-082- to Type 3670-A-082-R with Electroacoustic Engine and License

Supported Brüel & Kjær Accessories

AO-0546-W-002 DC Power Cable, cigarette lighter to Type 3670

TRANSDUCERS

HBK offers a wide selection of CCLD ear simulators, microphone preamplifiers, microphone assemblies and accelerometers that can be used with Type 3670.

Services Available

Type 3670—TCF Production Test USB DAQ, Conformance Test with Certificate