



InstruTECH LIH 8+8

16-bit Multi-Channel Data Acquisition System



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Introduction

The LIH 8+8 is a high resolution, low-noise scientific data acquisition system. It utilizes the latest USB 2.0 and high speed processing technologies. The LIH 8+8 provides expandability and versatility that will satisfy both current and future needs. With its USB 2.0 interface, the LIH 8+8 can easily be connected to a laptop computer without the need for a peripheral PCI card. The analog input and output channels are isolated from the digital lines that communicate with the computer. Each analog channel has its own separate ground patch and the digital section has a completely different ground. The result is complete isolation of the acquisition side from the computer side with full 16 bit capability and low noise.

Features

Expandability

The LIH 8+8 system is comprised of a USB 2.0 computer interface and one or multiple analog rack units interconnected by CAT5 cables. The USB 2.0 provides superb performance, while the CAT5 cables allow multiple racks to be synchronised during data acquisition. A single external trigger is capable of starting multiple racks simultaneously.

The number of racks supported by one computer is only limited by the number of USB connectors available in that computer. Multiple racks installed in the same computer or in separate computers can be synchronised.

Input and Output Channels

The LIH 8+8 provides eight analog differential inputs, four analog differential outputs via BNC connectors at the front panel. Sixteen digital inputs and sixteen digital outputs are provided on one connector at the rear panel. In parallel, 4 digital outputs and 4 digital inputs are provided via BNC connectors on the front panel. All channels are sampled synchronously.

Sound Generator

The LIH 8+8 has a sound generator built-in. A sound connector at the rear panel allows connection of an active speaker or a headset.

Acquisition Mode

The LIH 8+8 features cophasic acquisition of the two most relevant signals; ex. the current and voltage trace of the amplifier. The acquisition board samples these two AD-converters in parallel with no time delay. In the schematic below the two AD channels exhibiting cophasic acquisition are AD-0 and AD-1.

The eight analog differential input channels are separated into two banks of four. One bank is comprised of AD channels 0,2,4 and 6 and the other bank is comprised of AD channels 1,3,5 and 7. Each bank is multiplexed into one 16-bit 200 kHz A/D converter. Both A/D converters sample simultaneously and synchronously at the maximum conversion rate resulting in a total throughput of 400 kHz. This unique arrangement allows pairs of channels to be digitized without phase-shift (ex; AD-0 & AD-1). In other words, there is no time delay between two DA-channels firing and the time of acquisition of two cophasic AD-channels. If the bandwidth of the experiment calls for lower sampling rates, the interface adjusts the rate accordingly.

Software Control

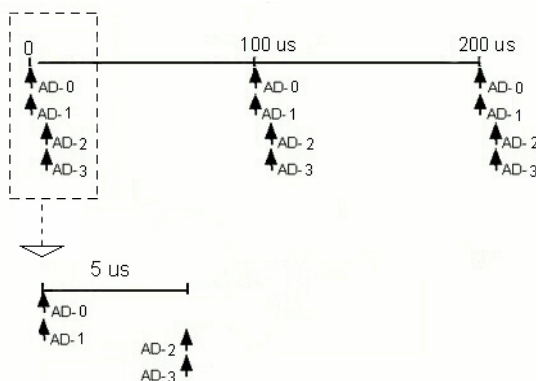
The LIH 8+8 can be controlled with PATCHMASTER, POTMASTER or CHARTMASTER software on either a Windows (2000/XP and VISTA) or Mac platform.

TIDA software can also be used to control the LIH 8+8 on a Windows (2000/XP) platform.

In situations where the LIH 8+8 is being integrated in a self-written data acquisition software on Windows, HEKA provides an EPC DLL (dynamic link library).

Time delays of 5 μ s per pair of AD-channels occur if there is acquisition from more than 2 AD-channels. This is illustrated in the schematic below as the slight separation between the sampling of the pair AD-0 and AD-1 and the sampling of the pair AD-2 and AD-3 and is shown in the insert.

Schematic illustrating a sampling rate of every 100ms (10KHz). The slight time delay between the sampling of pair AD-0 & AD-1 with pair AD-2 & AD-3 is 5ms (shown in the insert).



Product Content

- One LIH 8+8 rack mounted interface
- One printed manual
- Cables to connect the LIH 8+8 to the USB 2.0 interface and the power line

Item No.: LIH 8+8

Technical Specifications

Analog Inputs

- Eight 16-bit analog inputs
- Two A/D converters, each multiplexed into 4 inputs
- 400 kHz aggregate, max. 200 kHz per A/D converter
- Input type: differential
- Input Range: -10.24 to + 10.23 V
- Differential non-linearity: $\pm 0.002\%$ of FSR
- Drift: ± 2 ppm/ $^{\circ}$ C
- Input impedance: 1 MOhm
- Signal to noise ratio: 86dB at DC to 160 kHz, <1mV PP

Sound output

- One 3.5 mm output receptacle on rear panel
- Frequency range of 200 Hz to 4 kHz

Digital Inputs

- Sixteen rear digital inputs
- Four of the sixteen digital inputs can be accessed on the front panel via BNC connectors. The pin configurations are illustrated in the schematic.
- 3.3V and 5 V logic compatible

Trigger Inputs

- One isolated hardware trigger input (on either positive or negative edge transition)
- 3.3. and 5 V logic compatible
- One BNC on rear panel

Analog Outputs

- Four 16-bit analog outputs
- Four individual D/A converters, each running at 200 kHz
- Output type: pseudo differential
- Settling time: < 1 ms
- Output Range: -10.24 to + 10.23 V
- Gain error: 0.2 % of FSR
- Gain linearity: < 2 dB
- Drift: ± 4 ppm/ $^{\circ}$ C
- Output Impedance: 4.7 Ohm
- Signal to noise ratio: 116 dB

Digital Outputs

- Sixteen rear panel digital outputs
- Four of the sixteen digital outputs can be accessed on the front panel via BNC connectors. The pin configurations are illustrated in the schematic.
- TTL compatible
- Maximum output current +/- 35 mA

Additional Connectors

- Digital I/O connector for EPC 8 or TIB 14 S
- 2 CAT5 connectors for slave / master operation of multiple LIH 8+8

Dimensions

- (47.5 x 4.4 x 31.1) cm
- Weight: 3.6 kg
- mounts in 19" rack
- operates on 90 V- 250 V 50/60 Hz

Cable one USB 2.0 cable

Host Interface USB 2.0



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