HEAD acoustics

Ebertstraße 30a
52134 Herzogenrath
Tel.: +49 2407 577-0
Fax: +49 2407 577-99
E-Mail: info@head-acoustics.de
Web: www.head-acoustics.de

*lab*HSU (3710)

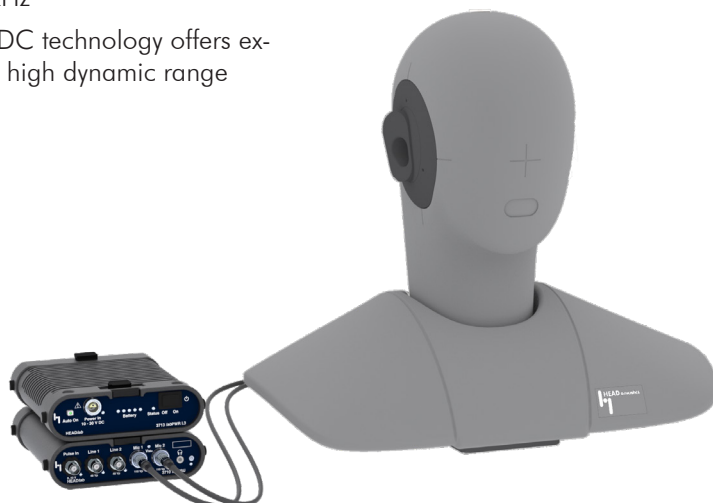HEAD*lab* high end 2 channel frontend

Features

Versatile possibilities

- Three modes of operation allow for aurally accurate measurements in various recording situations and offer maximum flexibility for the user:
  - *Frontend* mode connected to a PC (USB or LAN) with Arte-miS SUITE Data Acquisition Module ASM 04 (HEAD Recorder)
  - Integration into a HEAD*lab* system
  - *Stand alone* mode for mobile work without a PC (optional)
- Flexible power supply for various possible applications (galvanically isolated)
  - Mains adapter
  - Power box *lab*PWR I.3 (optionally connected to a vehicle's electrical system)
  - via HEAD*link* by a connected controller
- Maximum sampling rate in frontend mode and stand alone mode: 204,8kHz
- Dual ADC technology offers extremely high dynamic range

- In conjunction with *lab*PWR I.3 the auto on feature enables timer based power up for scheduled measurements (e.g. in a scheduled interval)
- Internal memory for audio recordings
- Supports condenser microphones with polarization voltage (+200 V, switchable per channel)
- Switchable high pass filter 22 Hz
- Cable breakage and short circuit detection for ICP sensors
- Automatic system check
- Signal inputs are galvanically isolated from PC interface and inputs of other HEAD*lab* modules

Artificial head- and binaural measurement systems

- Equalization for binaural sensors and artificial head measurement system with digital programmable filters on board

Overview

*lab*HSU is an exceptionally versatile binaural frontend in the proven format of the HEAD*lab* family. *lab*HSU can be operated as a frontend attached to a computer, as a module in a comprehensive HEAD*lab* system or, optionally, in stand alone mode with remote control via smartphone, tablet computer or the RC X remote control by HEAD acoustics. *lab*HSU supports artificial head and other binaural measurement systems from HEAD acoustics as well as condenser microphones, ICP sensors and pulse signals. The HEAD*link+* interface allows for connecting of HEAD*lab* modules or cascading of further *lab*HSU units. Together with the *lab*PWR I.3 power box from HEAD acoustics *lab*HSU can perform completely self sufficient measurements.

The equalization of binaural sensors can be performed directly by *lab*HSU (in stand alone mode) with digital, programmable filters. Equalization in post processing is not required and thus the operating comfort is improved.

The Dual ADC technology offers high end audio quality, extremely high dynamic range, enhances operating comfort by making the choice of measurement range unnecessary and reduces the risk of faulty measurements due to overdriven signals.

The headphone jack of *lab*HSU offers standard equalizations for various headphone models by HEAD acoustics and thus offers aurally accurate playback on board.

The USB ports offer versatile possibilities for storage media and comfortable operation using a smartphone or tablet PC via WiFi.

Mobile stand alone setup with *lab*HSU, *lab*PWR I.3 and HSU III

Features

- Memory capacity for individual equalization filter sets for several binaural measurement systems: Independent of direction (ID), Free field (FF), Diffuse field (DF), depending on the actual measurement system

- Connection and equalization of the binaural headset BHM III.3 or an artificial head microphone system HSU III.2 by means of the input connections Line 1 & 2

- Connection and equalization of the binaural headset BHM III.2 or an artificial head microphone system HSU III or HSU III.3 by means of the input connections Mic 1 & 2

- HMS IV artificial head (with adapter; connection and control)

Interfaces and connectors

- 2 x BNC analog inputs with switchable ICP® supply (22 V / 4 mA)

- 1 x BNC pulse in, galvanically isolated and with comprehensive configuration options

- 2 x LEMO 7pol. microphone in with switchable voltage supply and polarization voltage (200 V / 0,2 mA)

- 2 x USB type A for storage media, a WiFi adapter or the RC.X remote control

- 1 x USB type C connects to a Windows PC/-notebook/-tablet PC
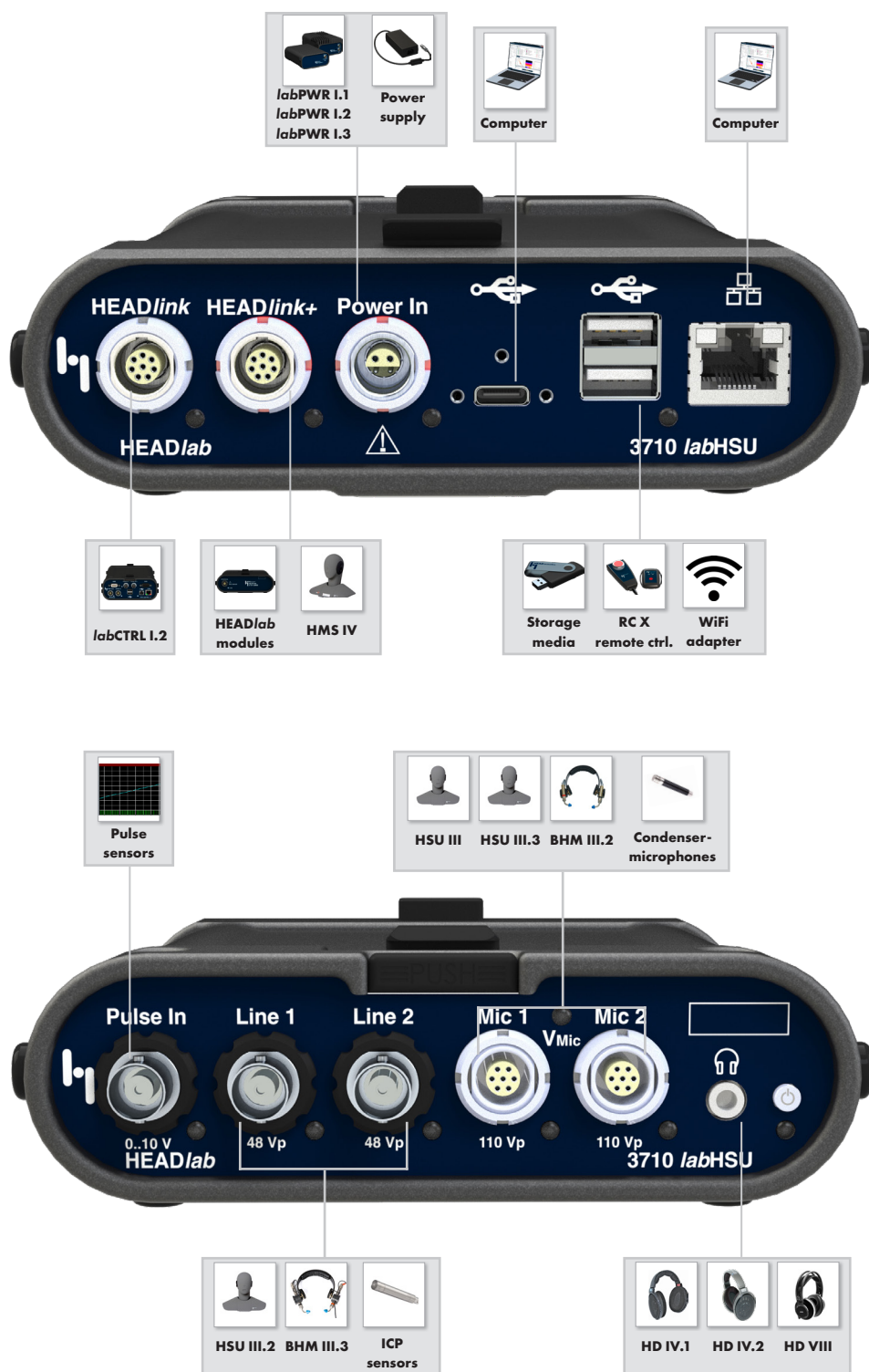
Features

- RJ45 LAN interface with 1 Gbit data rate max.
- 3,5 mm headphone jack

HEAD*link* and HEAD*link+*

The HEAD*link* and HEAD*link+* interfaces allow for a versatile connection with other members of the HEAD*lab* product family.

HEAD*link*

- The HEAD*link* interface allows you to integrate a *lab*HSU into a HEAD*lab* system by connecting it to a HEAD*lab* controller. *lab*HSU works like a HEAD*lab* module and transfers recorded signals to the controller. The HEAD*link* connection also provides supply voltage for *lab*HSU.

HEAD*link+*

- The HEAD*link+* interface allows you to connect any HEAD*lab* module in frontend mode and select modules in stand alone mode. This way different measurement channels can be added to *lab*HSU in a flexible and convenient way. The HEAD*link+* interface provides supply voltage for a connected module. The artificial head measurement system HMS IV can be connected to the HEAD*link+* interface by means of an adapter.

Playback via headphones

- 3,5 mm headphone jack for headphones by HEAD acoustics (e.g. HD IV.1)
- Playback equalizations Independent of direction (ID), Free field (FF), Diffuse field (DF) and *Linear* (LIN)
- Switchable limiter
- Standard equalizations for HEAD acoustics headphones
- Real time monitoring of single channels or a pair of channels via headphones
- Playback of saved recordings

Pulse in

- Recording of a pulse source in a dedicated channel
- Sampling of pulse sources with up to 1 MHz
- Integrated signal conditioning for amplification or clean up of the signal
- High sensitivity
- Adjustable trigger threshold
- Switchable circuitry for sensors with push-pull- or open collector output

Scope of supply and optional components

Scope of supply

- *lab*HSU (Code 3710)
  HEADlab High-End 2 channel frontend
- USB cable CUSB II (Code 5476); Typ A <–> Typ C with screwed connection

Optional accessories

- Tool Pack „Stand-alone-Recording" (Code 3710-01)
- HSU III (Code 1323)
- HSU III.2 (Code 1391)
- HSU III.3 (Code 1326)
- BHM III.2 binaural head microphone with 2 condenser measurement microphones (Code 1302)
- BHM III.3 binaural head microphone with 2 ICP microphone (Code 1303)
- USB storage HUSB III.64 (Code 3334)
- HD IV.2 headphones (Code 2481)
- WiFi adaptor
- AES cable CLX X (Code 3797)
- *lab*PWR I.3 power box (Code 3713)
- PS 24-60-L4 power supply (Code 0617)
- Remote control RC X.1 (Code 9850) with optional wireless module RC X.2 (Code 9851)
- Mounting adapter, active *lab*MA-a (Code 3760) for mechanical connection with HEAD*lab* modules
- Mounting adapter, passive *lab*MA-p (Code 3761) for mechanical connection with HEAD*lab* modules

Accessories for further extension

- *lab*CTRL I.2 LAN-/USB controller for HEAD*lab* systems (Code 3702)
- *lab*COMPACT12 / *lab*COMPACT24 HEAD*lab* compact modules with 12 / 24 analog-/ICP channels (Code 3708 & 3709)
- SQuadriga III Mobile measurement system for sound and vibration analysis (Code 3324)
- HEAD*lab* measurement modules (Code 37xx)
- HEAD*link* cable CLL X.xx (Code 3780-xx)

Software

- ArtemisS Suite Modular software-platform for the analysis of sound and vibration (Code 5000)
- ArtemisS Suite Recorder Data Acquisition module ASM 04 (Code 5004)
- Remote control app for Smartphone and tablet

Technical data

General

Terminals	2 x Line-/ICP®-In, 2 x Mic, 1 x pulse in, 1 x headphone jack
Communication interfaces	1 x HEAD*link*, 1 x HEAD*link+*, 1 x USB device, 2 x USB host, 1 x LAN (RJ-45)
Supply voltage	10 – 28 V DC

Power consumption
    operation
    standby
	
	Max. 15 W with sensors attached, max. 10 W *lab*HSU only
	0,015 W (typ.)

Sampling rates	Main sampling rates 32,768; 44,1; 48; 51,2 kHz; sub sampling rates configurable (at 48 kHz): 8, 16, 24, 48, 96, 192 kHz
Maximum sampling rate	204,8 kHz
Memory capacity	64 GB internally, approx. 50 GB for recordings and configurations
Cooling	Convection, fan-less
Dimensions	148 x 48 x 185 mm (WxHxD); incl. BNC sockets, locking mechanism and rubber feet)
Weight	750 g
Operating temperature	-10 °C – +60 °C
Storage temperature	-20 °C – +70 °C

Headphone out

Terminal	3,5 mm jack
Frequency range	20 Hz – 20 kHz
Channels	2
Configuration	Headphones
Resolution	32 bit
DC capable	no
Max. output power per channel	0,45 W
Maximum level	116 dB(V); with HD IV.2 headphones
Output impedance	10 Ohm

Pulse in

Terminal	BNC, 1 Pulse in
Channel configuration	Pulse
Coupling	DC
Pull up	5 V, 4-6 mA
Minimum pulse frequency	1 Hz
Maximum pulse frequency	500 kHz at Fs=48 kHz; 1 MHz at Fs >=96 kHz
Threshold value and hysteresis adjustable	Yes (digitally)
Input impedance	36 kOhm
Input voltage range	0 – +10 V (operation); ±50 V (max.), adjustable trigger threshold

USB device

Terminal	USB type C (screwed connection)
Data rate	USB 2.0 (480 MBit)

USB host

Terminal	USB type A; two sockets for storage media, WiFi adapter or remote control
Output voltage	5 V DC
Maximum power output	3,2 W
Output current per port	0,5 A
Total output current	0,65 A
Data rate	480 Mbit/s

LAN

Terminal	RJ45
Data rate	1 GBit/s

HEAD*link*

Terminal	Lemo 8 pin
Supply voltage	10 - 28 V DC
Synchronization	32; 32,768; 44,1; 48; 51,2 kHz
Maximum cable length	60 m

HEAD*link+*

Terminal	Lemo 8 pin
Output voltage	10 - 28 V
Maximum power output	10 W
Synchronization	32; 32,768; 44,1; 48; 51,2 kHz
Maximum cable length	60 m

Common characteristics of analog inputs (Line ICP® & Mic)

Channels	2 each
Input impedance	100 kOhm
Resolution	32 bit
Equalizations	FF, ID, DF
Measurement ranges (Vp)	0,048; 0,142; 0,448; 1,42; 4,48; 14,2; 44,8; 8,94 (HD Auto Range)
Measurement ranges (dB(V) + 6 dB Headroom)	-36; -26; -16; -6; 4; 14; 24; 10 (HD Auto Range)
Analog high pass filter (Hz)	2,5; 2. Order; +/-10% ; 22; 2. Order; Switchable; +/-5%
Digital high pass filter (Hz)	1 (with Fs=48kHz)

Characteristics Line ICP®

Terminals	BNC
Channel configuration	Line/ICP®
Coupling	AC, ICP®
Maximum input voltage	70 V
TEDS (IEEE 1451.4) read	TEDS class1, shared signal wire (Version 0.9 and 1.0)
Sensor supply voltage	22 V
Sensor supply current	4 mA per channel

Characteristics microphone input (Mic)

Terminals	Lemo 7pol
Channel configuration	Microphone in
Coupling	AC
Maximum input voltage	120 V
TEDS (IEE1451.4) read	TEDS Klasse 1, shared return wire (Version 0.9 and 1.0)
Sensor supply voltage	Switchable ±15, ±60, +120 V
Sensor supply current	20 mA (15 V), 14 mA (60 V), 15 mA (120 V)
Polarization voltage	200 V / 0,2 mA

Specifications analog inputs

Measurement ranges (Vp)	0,048	0,142	0,448	1,42	4,48	14,2	44,8	8,94*
Measurement ranges (dB(V)) *(plus 6 dB head room)*	-36	-26	-16	-6	4	14	24	10*
S/N (dB)	98	108	115	120	121	108	116	139
Dynamic range (dB) (5 Hz Analysis bandwidth)	133	143	150	155	156	143	151	174
THD+N *at 1 kHz, -1 dBFS*	-87	-97	-104	-106	-107	-99	-100	tba

*HD Auto Range

There is no standardized definition of "dynamic range".

Therefore, the **Signal to Noise Ratio** (SNR or S/N) value is given as a value for *lab*HSU. This based on the level of a sinusoidal tone with maximum modulation in relation to the full relevant bandwidth noise floor level of the system, measured with the entire relevant frequency range.

Sometimes in literature the term „**dynamic range**" is used identically to the S/N, but this "dynamic range" value is often based on a narrow-band calculation of the inherent noise.

Depending on the analysis bandwidth, *lab*HSU will then have a much higher "dynamic range" value.