



## Features

- Modular data acquisition system consisting of control, input and power supply modules
- Connection of up to two controllers *labCTRL* 1.2 via USB 2.0 to a computer
- Connection of one or (via LAN switch) several controllers *labCTRL* 1.2 via LAN to a PC (control and data transfer)
- Connection of up to 10 input modules to a controller
- For larger systems, the number of external channels is depending on the network load and the computing power of the PC
- Connecting artificial heads from HEAD acoustics, e.g. HMS IV, or binaural sensors, e.g. BHS II
- Connecting ICP, RPM, AC and DC sensors as well as condenser microphones
- CAN, OBD-2, FlexRay
- One individual sampling rate for each input module adjustable, depending on the system sampling rate
- Electrical isolation of the signal inputs to computer and power supply
- Low power consumption of the modules
- Mobile use without external power for up to 4 hours depending on the configuration
- 60 Wh battery capacity with *labPWR* 1.1 and *labPWR* 1.2
- All modules are silent (no fan)
- Rugged design
- Pulse signal conditioning via the SCU-P2 adapter (connected to *labCTRL* 1.2)
- Impedance converter SCU-V2 (connected to *labV12*, *labV12-V1*, *labV6*, *labVF6*)
- Data transmission with two *labOA* devices between controller and input signal across a distance of up to 1000 m

## DATA SHEET

### HEADlab (Code 3700)

Modular multi-channel 24 bit front-end system from HEAD acoustics

#### Overview

HEADlab is a modular multi-channel front-end system consisting of the central control unit *labCTRL* 1.2 plus various power supply and input modules. The controller is used to combine and synchronize data from input modules, and connects the system to a computer.

For the different types of sensors, corresponding input modules are available which are power supplied by a power module via a controller. The different modules can be connected to individual systems.

For larger systems up to two controllers can be used via USB or several controllers can be used via LAN switch (depending on the network load and the computing power of the PC).

The power modules *labPWR* 1.1 and *labPWR* 1.2 each include a battery, so that even large systems can be used without external power.

A system can be custom-built easily, since any modules may be mechanically mated via an integrated locking mechanism. Thus, various units can be combined into a compact setup.



## Controller

### labCTRL I.2



The controller is the central connection unit of a HEADlab system. It is used for data configuration and data concentration.

Each controller is equipped with a CAN/OBD-2 interface and two pulse interfaces, and also allows for connecting a digital artificial head (HMS III or HMS IV) directly.

In addition, each controller can be connected with ten input modules and the channels are recorded with sample accuracy. Each connection to the input modules consists of a single cable. The complete wiring is radial.

For control and for data transfer to the computer *labCTRL I.2* is equipped with USB. In USB mode two controllers can be controlled by a PC simultaneously, allowing recordings with up to 120 external channels at a sampling rate of 48 kHz or 240 channels at 24 kHz.

With the *labCTRL I.2*, control and data transfer can be performed via LAN too. The number of controllers *labCTRL I.2* used in a system with a LAN switch is depending on the computing power of the PC

All controllers in a system must be connected and synchronized with each other via the cable CLL X.xx respectively the cable CBB I.1.

## Input Modules

### labV6/labVF6



The input modules *labV6* and *labVF6* are 6-channel ICP modules. The *labVF6* is equipped with additional low-pass filters.

Both input modules run silently and have excellent characteristics, such as a signal-to-noise ratio of 108 dB(A), typ. TEDS sensors are supported.

Due to their low power consumption of 4.8 W, individual modules can run up with a controller to four hours with a battery-equipped power module and without external power.

### labV12/labV12-V1/labV12-V2



*labV12* as well as the variants *labV12-V1* and *labV12-V2* are 12-channel Line/ICP modules with a channelwise switchable low-

pass filter and a dynamic of typ. 107 dB(A).

At the front of the modules the interfaces are summarized in two D-Sub sockets to connect the sensors via breakout cables (6 x BNC or Microdot). The modules support TEDS sensors.

The variants *labV12-V1* and *labV12-V2* have higher input impedances (300 kOhm respectively 1 MOhm) and lower AC cut-off frequencies (0.35 respectively 0.4 Hz).

Connecting a *labV12* module with a controller via both HEADlink interfaces simultaneously, the available sampling rate will be doubled (Dual-Link).

### labM6/labM6-V1



The 6-channel microphone modules *labM6* and the variant *labM6-V1* are used for connecting condenser microphones (Lemo

interfaces). Via BNC adapters, operations with ICP sensors (AC or DC) are possible. The modules feature a high phase accuracy of the 24-bit data and a signal-to-noise-ratio of typ. 108 dB (A).

The variant *labM6-V1* provides a reduced supply voltage of the impedance converter ( $\pm 14.5$  V), allowing, for example, to connect low-noise microphones.

### labDX



The digital module *labDX* has two CAN inputs respectively one FlexRay input, two Pulse inputs and a AES/RS232 interface for connecting

and controlling an artificial head of the HMS III or HMS IV generation.

Both pulse inputs may receive high pulse rates (without signal conditioning) or low pulse rates (with signal conditioning and offset compensation).

### labHMS



*labHMS* is used for connecting and controlling three digital artificial heads of the HMS III or HMS IV generation.

In combination *labCTRL I.2* operations with four artificial heads, e.g. for wind tunnel applications are possible.

## Power Modules

### labPWR I.1/labPWR I.2



The power modules *labPWR I.1* and *labPWR I.2* convert the external supply voltage to the system voltage of 24 V required by HEADlab

modules. The power modules are fed with DC voltage (e.g. vehicle power supply voltage or PSH I.1 or PSH IV from HEAD acoustics). Whereas the *labPWR I.1* feeds systems with a requirement of up to 40 W, the *labPWR I.2* provides up to 100 W.

Both *labPWR I.1* and *labPWR I.2* include a battery with a capacity of 60 Wh. Depending on the number of connected modules operation without external power is possible.

Uninterrupted switching between external power supply and battery is guaranteed. Both modules can automatically enter an „idle mode“, depending on the application, extending the runtime of the battery.

The charge status of the battery can be directly read from the device (in 20% steps) or queried via the controller (in 1% steps). Since a fan is not required, both modules run silently.

## Mechanical Connection

A HEADlab system can be easily assembled, and is reliable and stable in any configuration.

All control modules and input modules are equipped with an integrated locking mechanism consisting of an active part (at the top) and a passive part (at the bottom). The modules can be easily attached and detached. Up to 12 modules may be mechanically coupled.



Multiple modules can be easily assembled and disassembled, and form a stable unit in any configuration

## Accessories

The accessories (mount adapters, mounting plates, retractable carry handles, magnetic mounts) can be versatilely combined and allow for easy transport and safe mounting of the HEADlab systems.



Due to the mount adapters and mounting plates a system is fastened e.g. on a car seat quickly and conveniently

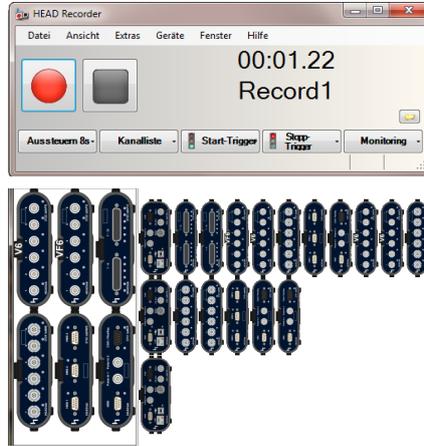
## labOA

In combination with two opto-adapters *labOA* a data transmission across a distance of up to 1000 meters (0.6 miles) is possible.

## Recording Software

For configuration, control and recording, the HEAD Recorder, an ArtemiS SUITE module, is available.

Thus, using the graphical display in the frontend view larger systems can be configured quickly and safely.



Configuration and control of a HEADlab system can be performed intuitively with the recording software HEAD Recorder



In combination with a controller, the SCU-P2 adapter is used for conditioning of pulse signals



In combination with the input modules *labV12* and *labV6*, the SCU-V2 adapter is used for connecting high-impedance sensors

## Inputs

The controllers and the input modules of a HEADlab system can be connected with different sensors directly or via adapters.

- Artificial heads of the HMS III and HMS IV generation
- Binaural sensors from HEAD acoustics, e.g. the BHS II headset
- ICP sensors (TEDS)
- Condenser microphones, incl. low-noise microphones (TEDS)
- Pressure, temperature etc. sensors (DC)
- RPM sensors
- CAN, OBD-2, FlexRay
- High-impedance voltage sources

## Pulse conditioning

If a pulse signal level is too low or the signal is not available as TTL shape, the SCU-P2 adapter can be used for amplifying the signals, converting them to the TTL signal shape and passing them to a *labCTRL* I.2.

## Impedance converter

The SCU-V2 adapter is a two-channel impedance converter, allowing the measurement of high-impedance voltage sources with *labV12* (*labV12-V1*) and *labV6* (*labVF6*).

## Controllers

- *labCTRL* I.2 (Code 3702)  
USB/LAN controller

## Power Modules

- *labPWR* I.1 (Code 3711)  
Power box  
(up to max. 40 W)
- *labPWR* I.2 (Code 3712)  
Power box  
(up to max. 100 W)

## Input Modules

- *labV6* (Code 3721)  
6-channel Line/ICP module with BNC
- *labVF6* (Code 3722)  
6-channel Line/ICP module with BNC and low-pass filter
- *labV12* (Code 3723)  
12-channel Line/ICP module  
(2 x D-Sub); AC/DC/ICP;  
30 k $\Omega$  input impedance,  
0.25 Hz AC cut-off frequency
  - Variant 1: *labV12-V1*  
(Code 3723-V1)  
300 k $\Omega$  input impedance,  
0.35 Hz AC cut-off frequency
  - Variant 2: *labV12-V2*  
(Code 3723-V2)  
1 M $\Omega$  input impedance,  
0.4 Hz AC cut-off frequency
- *labM6* (Code 3724)  
6-channel module with Lemo inter-  
faces for condenser microphones;  
AC/DC/ICP (with BNC adapter);  
 $\pm 60$  V supply voltage of the imped-  
ance converter
  - Variant: *labM6-V1*  
(Code 3724-V1)  
 $\pm 14.5$  V supply voltage of the  
impedance converter
- *labDX* (Code 3741)  
Input module with CAN, FlexRay,  
pulse and AES/RS232 interfaces
- *labHMS* (Code 3742)  
Input module with 3 AES/RS232  
interfaces for connection of HMS  
artificial heads
- SQuadriga II (Code 3320)  
6-channel input module

## Power Supplies

- PSH I.3 (Code 3719)  
Mains power supply for *labPWR* I.1  
(100 V-240 V AC, 50 Hz-60 Hz)
- PSH I.4 (Code 3718)  
Mains power supply for a HEADlab  
system with up to 6 input modules  
(100-240 V AC, 50 Hz-60 Hz)
- PSH IV (Code 1517)  
Mains power supply for *labPWR* I.2  
(85 V-264 V AC, 47-63 Hz)

## Hardware Accessories

- *labCASE* I.1 (Code 3770)  
Carrying case for HEADlab
- *labOA* (Code 3785)  
Opto-adaptor Converter (optical/  
electrical) for data transmission be-  
tween controller and input module  
across a distance of up to 1000  
meters
- *labMA-a* (Code 3760)/*labMA-p*  
(Code 3761)  
Mount adapters for HEADlab sys-  
tems, active/passive lock
- *labMP* I.1 (Code 3762)  
Mounting plate, e.g. for car seats
- *labRCH* I.1 (Code 3763)  
Retractable carry handle for  
HEADlab systems
- *labMM* (Code 3769)  
magnetic mounts for attaching  
HEADlab systems
- HSM V (Code 1520)  
HEAD seat mount adapter for  
HMS IV, HEADlab etc.

## Software (required)

- HEAD Recorder  
ArtemiS SUITE Data Acquisition  
Module (Code 5004)
  - ArtemiS SUITE Basic Framework  
(Code 5000)

## Software (optional)

- ArtemiS SUITE (Code 5000ff)  
Additional ArtemiS SUITE Module
- For further processing of CAN data  
ASM 24 (Code 5024) is required

## Cables/Adapters

- CLL X.xx (Code 3780-xx)  
Connection cable,  
input module  $\leftrightarrow$  controller/  
synchronization  
*labCTRL* I.2  $\leftrightarrow$  *labCTRL* I.2
- CLL XI.xx (Code 3781-xx)  
Connection cable,  
power box  $\leftrightarrow$  controller
- CLO X3 (Code 3782-3)  
Power-in cable for power box, 3 m  
(118")
- CDX X.3 (Code 3783-3)  
HMS connection cable, 3 m (118")
- CDO X.3 (Code 3786-3)  
OBD-2 connection cable, 3 m  
(118")
- CUSB II.1.5 (Code 5478-1.5)  
Cable USB 2.0, 1.5 m (59")
- CUSB II.5 (Code 5478-5)  
Cable USB 2.0, 5 m (197")
- CSS X.xx (Code 3789-xx)  
Fiber optics patch cable multi-  
mode, duplex, SC/PC  $\leftrightarrow$  SC/PC

- CBL X.01 (Code 3791-01)  
Adapter cable,  
Lemo  $\leftrightarrow$  BNC, 10 cm (3.94")  
(*labM6*)
- CDB II.1 (Code 3556)  
Breakout cable D-Sub  $\leftrightarrow$  6 x BNC ,  
male (*labV12*), 1 m (39.4")
- CDB X.1 (Code 3592)  
Breakout cable D-Sub  $\leftrightarrow$  6 x BNC ,  
female (*labV12*), 1 m (39.4")
- CDM X.03 (Code 3793-03)  
Breakout cable D-Sub  $\leftrightarrow$  6 x  
Microdot (*labV12*), 30 cm (11.8")
- CMD 0.12 (Code 3788)  
Breakout cable D-Sub  $\leftrightarrow$  3xD-Sub  
(CAN 1, CAN 2, FlexRay) (*labDX*),  
12 cm
- Cable LAN, 3 m (118")
- CLD VII.6 (Code 3356)  
Adapter SQuadriga II  $\leftrightarrow$  HEADlab
- CLB I.2 (Code 9847)  
Adapter BHS II  $\leftrightarrow$  HEADlab (*labV6*,  
*labV12* via CDB II.1, *labM6* via  
CBL X.01)
- SCU-P2 (Code 3393)  
Adapter for pulse signal condition-  
ing and for passing the TTL-com-  
patible pulses to *labCTRL* I.2
- SCU-V2 (Code 3394)  
Adapter for connecting high-im-  
pedance voltage sources to *labV12*  
(*labV12-V1*) and *labV6* (*labVF6*)
- *labADAT* (Code 3794)  
ADAT adapter for monitoring  
HEADlab recordings with the PEQ V  
equalizer
- PEQ V (Code 2492)  
Programmable digital equalizer
- HD IV.1 (Code 2380)  
Open, dynamic headphone