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DATA SHEET

*lab*V12 II (Code 3753)

12-channel voltage/ICP input module of the 2nd HEAD*lab* generation for applications with larger numbers of channels

Overview

*lab*V12 II is an input module of the 2nd HEAD*lab* generation. Thanks to the support of the HEAD*link* 2.0 transmission protocol, the input module offers double the sampling rate with the same number of channels compared to HEAD*link* 1.0. In combination with the Controller of the 2nd HEAD*lab* generation *lab*CTRL II.1, *lab*V12 II achieves a maximum sampling rate of 204.8 kHz.

Furthermore, the compact and rugged input module features a particularly favorable lower cutoff frequency and an input impedance of 1 MΩ.

Users can adjust their ranges flexibly between 10 mV and 30 V and are largely protected against errors in the measurement setup thanks to the overload detection and the maximum electric strength of 60 V.

In addition, *lab*V12 II provides the ICP-DC coupling developed by HEAD acoustics, e.g., for measuring low-frequency signals with seismic sensors.

At the front of the input module, the interfaces are summarized in two D-Sub sockets to connect the sensors via breakout cables.

Features

204.8 kHz maximum sampling rate

- Sampling frequencies:
  - 2.048 kHz up to 131.072 kHz @ 32.768 (2^n) kHz
  - 2.75625 kHz to 176.400 kHz @ 41.1 kHz
  - 3 kHz up to 192 kHz @ 48 kHz
  - 3.2 kHz up to 204.8 kHz @ 51.2 kHz
- A common sampling rate can be set for each group of 6 channels

Dual Link

- Simultaneous connecting of *lab*V12 II via HEAD*link* 1 and HEAD*link* 2 to a Controller or front-end for measurements with double sampling rate

Transmission protocol HEAD*link* 2.0

Via *lab*CTRL II.1 at system sampling frequencies 32.768 (2^n) kHz / 48 kHz / 51.2 kHz

- Dual Link
  - Up to 12 channels with up to 65.536 kHz / 96 kHz / 102.4 kHz
  - Up to 6 channels with up to 131.072 kHz / 192 kHz / 204.8 kHz
- Single Link
  - Up to 12 channels with up to 32.768 kHz / 48 kHz / 51.2 kHz
  - Up to 6 channels with up to 65.536 kHz / 96 kHz / 102.4 kHz
  - Up to 3 channels with up to 131.072 kHz / 192 kHz / 204.8 kHz

Coupling

- Switchable: DC, AC, ICP, ICP-DC

Ranges

- 0.01 V, 0.1 V, 1 V, 10 V, 30 V

Favorable lower cutoff frequency

- 0.14 Hz

High input impedance

- 1 MΩ

0 Hz ICP-DC coupling from HEAD acoustics

- 0 Hz to 86.4 kHz frequency range

Connection to Controllers/front-ends from HEAD acoustics

- Via transmission protocol HEAD*link* 2.0
  - Controller *lab*CTRL II.1
- Via transmission protocol HEAD*link* 1.0
  - Controller *lab*CTRL I.2, *lab*CTRL I.1
  - HEAD*lab* high-end dual-channel data acquisition system *lab*HSU
  - Compact systems *lab*COMPACT12-V1, *lab*COMPACT24-V1
  - Binaural artificial head of the latest generation HMS V
  - BrakeOBSERVER frontend MMF III.0
  - HEAD VISOR frontend VMA II.1

Connection of sensors

- Voltage/ICP sensors (TEDS)
- Head-shoulder unit HSU III.2
- Binaural headset BHS II
- Head microphones BHM III.3
- High-impedance voltage sources

Features

Power Supply

- Power supply by Controller/frontend via HEAD*link* 1
- 8.7 W power consumption

More features

- Silent (no fan)
- Rugged design
- 60 V electric strength
- Overload detection for automatic disconnection of effected channels in case of overvoltages
- Electrical isolation of the *lab*V12 II inputs from the inputs of other modules of a HEAD*lab* system and the PC interface

Filters

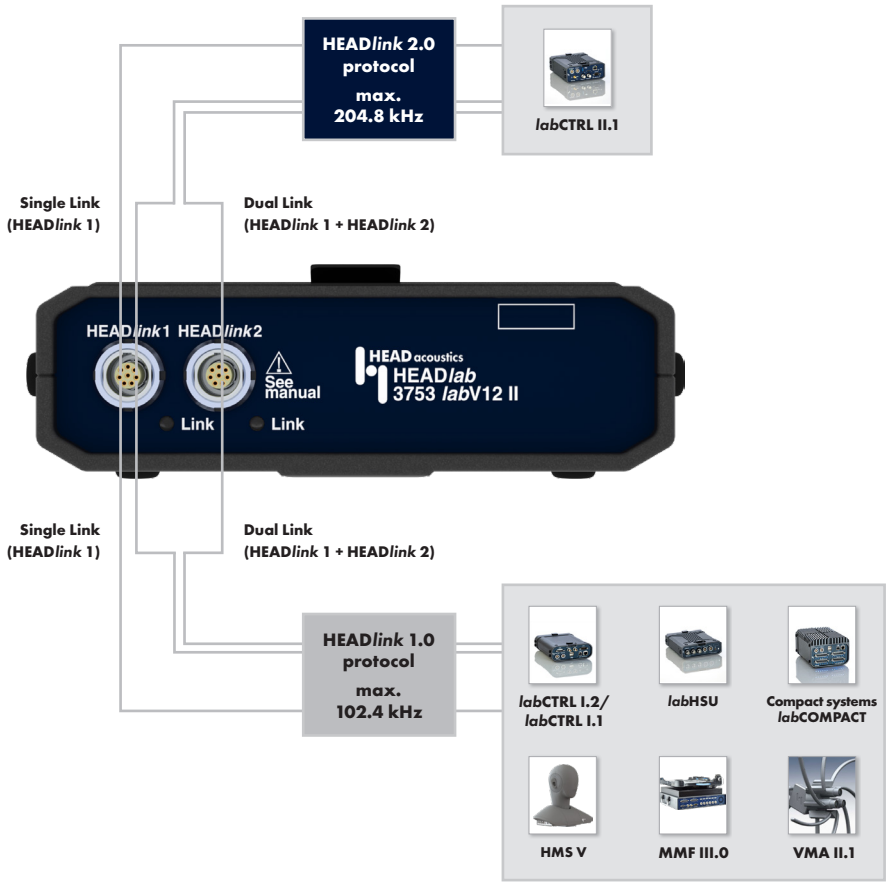
- Analog highpass filters
  - 0.14 Hz, 1st order (cannot be switched off in AC mode)
  - 22 Hz, 2nd order (switchable channel by channel)

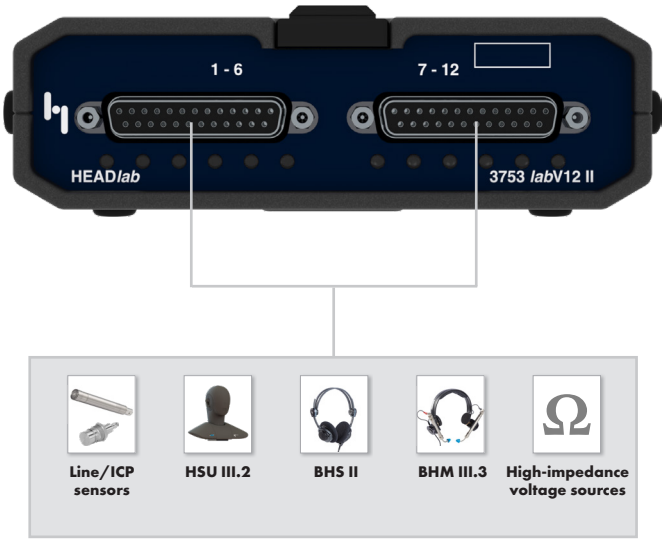
Handling

- Integrated locking mechanism (the modules can easily be mated to a system)

HEAD*lab* systems

- Systems with a *lab*CTRL II.1 Controller (and a Power Box *lab*PWR)
  - Via Single Link: Connecting up to 10 *lab*V12 II input modules
  - Via Dual Link: Connecting up to 5 *lab*V12 II input modules
- Depending on the processing power of the PC and the network utilization, larger systems with several Controllers *lab*CTRL II.1 (and Power Boxes *lab*PWR) can record up to 600 channels simultaneously.





Scope of supply

- *lab*V12 II (Code 3753)
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Optional

- CDB X.1 (Code 3792)
  Breakout cable D-Sub 25-pin ↔ 6 x BNC female, 1 m
- CDB II.1 (Code 3556)
  Breakout cable D-Sub 25-pin ↔ 6 x BNC male, 1 m
- CDM X.03 (Code 3793-03)
  Breakout cable D-Sub 25-pin ↔ 6 x Microdot, 30 cm
- CLL X.xx (Code 3780-xx)
  Cable HEAD*link* Lemo 8-pin ↔ Lemo 8-pin
- CLB I.2 (Code 9847)
  Adapter for connecting BHS II (via CDB X.1)

Technical data

General

Connectors data acquisition/data generation	12 x voltage-in/ICP-in
Communication interfaces	2 x HEAD*link*
Supply connection	HEAD*link* 1 (input)
Supply voltage	10 V_{DC} to 28 V_{DC}
Max. power consumption stand-alone operation	7.2 W
Max. power consumption with sensors connected	8.7 W
System sampling frequency	32.768 (2^n) kHz (with *lab*CTRL II.1), 44.1 kHz (with *lab*HSU/ HMS V), 48 kHz, 51.2 kHz
Min. to max. sampling frequency @ 32.768 (2^n) kHz	2.048 kHz to 131.072 kHz
Min. to max. sampling frequency @ 44.1 kHz	2.75625 kHz to 176.400 kHz
Min. to max. sampling frequency @ 48 kHz	3 kHz to 192 kHz
Min. to max. sampling frequency @ 51.2 kHz	3.2 kHz to 204.8 kHz
Synchronization	HEAD*link*
Max. sampling frequency	204.8 kHz
Cooling	Convection, no fan
Operating temperature	-10 °C to +60 °C
Storage temperature	-20 °C to +70 °C
Dimensions	148 x 173 x 48 mm (W x D x H)
Weight	712 g

Digital HEAD*link*

Connector	2 x Lemo 8-pin
Number of interfaces	2
Supply voltage	10 V_{DC} to 28 V_{DC}
HEAD*link* version	HEAD*link* 1.0, HEAD*link* 2.0
Electrical isolation	Yes
Synchronization	32.768 (2^n) kHz, 44.1 kHz, 48 kHz, 51.2 kHz
Maximum cable length	60 m

Analog input voltage/ICP

Number of channels	12
Connector	2 x D-Sub 25-pin
Quantity	Voltage
Ranges	0.01 Vp, 0.1 Vp, 1 Vp, 10 Vp, 30 Vp
Input impedance	1000 kΩ
Frequency range	0 Hz to 86.4 kHz
Coupling	DC, AC, ICP, ICP-DC
Analog highpass filter	0.14 Hz, 1st order, ±5% 22 Hz, 2nd order, switchable, ±5%
Digital highpass filter @ fs = 48 kHz, proportional to fs	0.1 Hz
Digital lowpass filter @ fs = 48 kHz, proportional to fs	21.6 kHz
Resolution	32 bit
Electrical isolation input/output	Yes
Electrical isolation channel by channel	No
Max. input voltage	60 V
TEDS (IEEE 1451.4) read	TEDS class 1, shared signal wire (version 0.9 and 1.0)
ICP voltage	22.8 V
ICP current	4 mA (±7.5%)
Common mode rejection	90 dB

Analog input voltage/ICP – ranges

Range	0.01 Vp	0.1 Vp	1 Vp	10 Vp	30 Vp
S/N	84 dB(A)	103 dB(A)	109 dB(A)	109 dB(A)	108 dB(A)
Crosstalk	-104 dB	-115 dB	-131 dB	-129 dB	-127 dB
THD+N	-81 dB	-99 dB	-108 dB	-105 dB	-83 dB
Dynamic 5 Hz analysis bandwidth	121 dB	139 dB	145 dB	145 dB	144 dB
Input related noise (24 kHz bandwidth)	0.65 µV	0.75 µV	3.6 µV	36 µV	120 µV
AC accuracy @ 1 kHz	2.5%	0.4%	0.4%	0.4%	0.4%
DC acuracy	1.5%	0.25%	0.1%	0.1%	0.1%
Frequency response 20 Hz to 20 kHz @ fs = 48 kHz	+0.05 dB, -0.02 dB	+0.07 dB, -0.02 dB	+0.09 dB, -0.02 dB	+0.08 dB, -0.02 dB	+0.02 dB, -0.78 dB
Frequency response 20 Hz to 40 kHz @ fs = 96 kHz	+0.05 dB, -0.05 dB	+0.07 dB, -0.02 dB	+0.11 dB, -0.02 dB	+0.08 dB, -0.02 dB	+0.04 dB, -2.54 dB
Frequency response 20 Hz to 80 kHz @ fs = 192 kHz	+0.05 dB. -0.3 dB	+0.05 dB. -0.02 dB	+0.15 dB. -0.02 dB	+0.08 dB. -0.02 dB	+0.05 dB. -6.17 dB
Linearity 0 to 80 dB below full scale	0.28 dB	0.05 dB	0.03 dB	0.03 dB	0.03 dB
Linearity 80 to 100 dB below full scale	2 dB	0.35 dB	0.08 dB	0.08 dB	0.11 dB