



Code 3752

labVF6 II

6-channel voltage/ICP input module of the second HEADlab generation with switchable lowpass filters for connecting analog and ICP sensors for fast and straightforward data acquisition.

OVERVIEW

labVF6 II

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labVF6 II is a 6-channel input module of the second HEADlab generation with switchable lowpass filters. Thanks to the support of the HEADlink 2.0 transmission protocol, the input module offers twice the sampling rate with the same number of channels compared to HEADlink 1.0.

In combination with the controller of the second HEADlab generation labCTRL II.1, labVF6 II achieves a maximum sampling rate of 204.8 kHz.

The ranges can be adjusted flexibly between 10 mV and 30 V. The overload detection and the maximum electric strength of 60 V provide a high level of protection against errors in the measurement setup. Users can directly connect their sensors to the 6 BNC sockets of the input module.



KEY FEATURES

Input module of the second HEADlab generation

Data acquisition with 6 analog and ICP sensors

204.8 kHz maximum sampling rate

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

Measurement ranges: 0.01 V_{pr}, 0.1 V_{pr}, 1 V_{pr}, 10 V_{pr}, 30 V_{pr}

Favorable lower cutoff frequency: 0.14 Hz

High input impedance: 1 MΩ

Electric strength: maximal 60 V

Analog lowpass filters (switchable channel by channel)

- › 1 kHz, 2nd order
- › 5 kHz, 2nd order

Analog highpass filters

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

Overload detection for automatic switch-off of effected channels

0 Hz ICP-DC coupling by HEAD acoustics, e.g., for measuring low-frequency signals with seismic sensors

Electrical isolation of the inputs from the inputs of other modules of a HEADlab system and the PC interface

Power supply via HEADlink

Rugged; compact design; noiseless (without fan)

APPLICATIONS

- › Fast and straightforward data acquisition

DETAILS

System sampling rate

The system sampling rate of a HEADlab system with one or more *labVF6 II* input modules can be flexibly adjusted. A maximum sampling rate of 204.8 kHz is possible.

- > 2.048 kHz up to 131.072 kHz @32.768 (2ⁿ) kHz
- > 3 kHz up to 192 kHz @48 kHz
- > 3.2 kHz up to 204.8 kHz @51.2 kHz

HEADlink 2.0 transmission protocol

labVF6 II is characterized in particular by the HEADlink 2.0 transmission protocol and is connected to a *labCTRL II.1* controller or a second-generation compact system via HEADlink cable. Compared to the HEADlink 1.0 transmission protocol of the first HEADlab generation, HEADlink 2.0 enables twice the sampling rate with the same number of channels.

| via <i>labCTRL II.1</i> at a system sampling rate of | 32.768 (2 ⁿ) kHz | 48 kHz | 51.2 kHz |
|--|------------------------------|-----------|-------------|
| up to 6 channels | ≤ 65.536 kHz | ≤ 96 kHz | ≤ 102.4 kHz |
| up to 3 channels | ≤ 131.072 kHz | ≤ 192 kHz | ≤ 204.8 kHz |

Modular HEADlab system

HEADlab systems can be configured individually and customized using controllers, various input, playback, and power supply modules, as well as other accessories. With ten *labVF6 II* devices connected, for example, a *labCTRL II.1* controller enables measurements with up to 60 channels.

Several controllers can be connected to form larger HEADlab systems. Via LAN, the number of controllers and channels used in a HEADlab system depends on the capacity of the network and the computing power of the PC. A standard PC can record several hundred channels with sampling rates from 2.048 kHz up to 204.8 kHz.

Second and first generation controllers and modules are compatible with each other. First-generation input modules can be combined with a second-generation controller and vice versa. In mixed operation, the HEADlink transmission protocol to be used is automatically determined between the controller and module.



CONNECTIONS

CONTROLLING / POWER SUPPLY



CONNECTION TO CONTROLLER / FRONTEND / SYSTEM

HEADlink protocol 2.0 via HEADlink

- › Controller *labCTRL II.1*
- › Compact systems *labCOMPACT12 II*, *labCOMPACT24 II*

HEADlink protocol 1.0 via HEADlink

- › Controllers *labCTRL I.2*, *labCTRL I.1*
- › High-End 2-channel frontend *labHSU*
- › Artificial head *HMS V*
- › Compact systems *labCOMPACT12(-V1)*, *labCOMPACT24(-V1)*
- › HEAD VISOR frontends *VMA V*, *VMA II.1*
- › BrakeOBSERVER frontend *MMF III.0*

DATA ACQUISITION



CONNECTION OF SENSORS

Via BNC

- › Voltage/ICP sensors (TEDS)
- › Triax sensors (Microtech)
- › Mobile HEAD microphone for binaural recordings *BHM III.3*
- › Artificial head *HSU III.2*
- › Binaural headset *BHS II*
- › Voltage sources
- › ...

TECHNICAL DATA

| General | |
|---|--|
| Connectors data acquisition/ data generation | 6 x voltage-in/ICP-in |
| Communication interfaces | 1 x HEADlink |
| Supply connection | HEADlink |
| Supply voltage | 10 V _{DC} to 28 V _{DC} |
| Reverse polarity protection | No |
| Max. power consumption stand-alone operation | 5.5 W |
| Max. power consumption with sensors connected | 6.5 W |
| System sampling rate | 32.768 (2 ⁿ) kHz, 44.1 kHz, 48 kHz, 51.2 kHz |
| Min. to max. sampling rate @32.768 (2 ⁿ) kHz | 2.048 kHz to 131.072 kHz |
| Min. to max. sampling rate @44.1 kHz | 2.75625 kHz to 176.4 kHz |
| Min. to max. sampling rate @48 kHz | 3 kHz to 192 kHz |
| Min. to max. sampling rate @51.2 kHz | 3.2 kHz to 204.8 kHz |
| Synchronization | HEADlink |
| Max. sampling rate | 204.8 kHz |
| Cooling | Convection (without fan) |
| Operating temperature | -10 °C to +60 °C |
| Storage temperature | -20 °C to +70 °C |
| Dimensions | 148 x 48 x 173 mm (WxHxD) |
| Weight | 669 g |

| HEADlink | |
|----------------------|--|
| Connector | 1 x LEMO 8 pin |
| Number of interfaces | 1 |
| Supply voltage | 10 V _{DC} to 28 V _{DC} |
| HEADlink version | HEADlink 1.0, HEADlink 2.0 |
| Galvanic isolation | Yes |
| Synchronization | 32.768 (2 ⁿ) kHz, 44.1 kHz, 48 kHz, 51.2 kHz |
| Maximum cable length | 60 m |

| Voltage/ICP (analog inputs)¹ | |
|--|---|
| Connector | 6 x BNC |
| Number of channels | 6 |
| Quantity | Voltage |
| Ranges | 0.01 V _{pr} , 0.1 V _{pr} , 1 V _{pr} , 10 V _{pr} , 30 V _p |
| Input impedance | 1000 kΩ |

| Voltage/ICP (analog inputs) | |
|--|--|
| Frequency range | 0 Hz to 86.4 kHz |
| Coupling | DC, AC, ICP, ICP-DC |
| Analog highpass filter | 0.14 Hz, 1st order, $\pm 5\%$ 22 Hz, 2nd order, switchable, $\pm 5\%$ |
| Analog lowpass filter | 1 kHz, 2nd order, switchable, $\pm 5\%$ 5 kHz, 2nd order, switchable, $\pm 5\%$ |
| 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 |
| Electric strength | ± 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% / +25%) |
| Common mode rejection | 90 dB |

| Voltage/ICP – ranges (analog inputs)¹ | | | | | |
|---|-----------------------|-----------------------|-----------------------|-----------------------|----------------------|
| Range | 0.01 V _p | 0.1 V _p | 1 V _p | 10 V _p | 30 V _p |
| S/N | 84 dB(A) | 103 dB(A) | 109 dB(A) | 109 dB(A) | 108 dB(A) |
| Crosstalk at 1 kHz | -104 dB | -115 dB | -126 dB | -129 dB | -110 dB |
| THD+N | -81 dB | -99 dB | -108 dB | -104 dB | -82 dB |
| Dynamic 5 Hz analysis bandwidth | 120 dB | 139 dB | 145 dB | 145 dB | 144 dB |
| Input related noise (24 kHz bandwidth) | 0.9 μ V | 1 μ V | 5 μ V | 50.1 μ V | 168.7 μ V |
| DC accuracy | 1.5 % | 0.25 % | 0.1 % | 0.1 % | 0.1 % |
| AC accuracy at 1 kHz | 2.5 % | 0.4 % | 0.4 % | 0.4 % | 0.4 % |
| Frequency response 20 Hz to 20 kHz @fs = 48 kHz re 1 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, -1.1 dB |
| Frequency response 20 Hz to 40 kHz @fs = 96 kHz re 1 kHz | +0.05 dB, -0.03 dB | +0.07 dB, -0.02 dB | +0.11 dB, -0.02 dB | +0.08 dB, -0.02 dB | +0.04 dB, -3.3 dB |
| Frequency response 20 Hz to 80 kHz @fs = 192 kHz re 1 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, -7.4 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 0 to 100 dB below full scale | 2 dB | 0.35 dB | 0.08 dB | 0.08 dB | 0.11 dB |

¹ Valid for: ambient temperature 23 °C/73 °F (± 3 °C/37 °F), operating duration ≥ 1 h. Vibration excitation of the device can cause deviations.

All measurement ranges are calibrated at the factory. In addition, the measurement ≥ 100 mV_p to 30 V_p can be calibrated in the accredited calibration laboratory of HEAD acoustics GmbH in accordance with DIN EN ISO 17025.

ICP is a registered trademark of PCB Piezotronics Inc.; LEMO is a registered trademark of LEMO SA.

Dynamics

There is no standardized definition of „dynamics“.

Therefore, the Signal to Noise Ratio (SNR or S/N) value is given for *labVF6 II*. This is calculated based on the level of a sinusoidal tone with maximum modulation in relation to the full relevant bandwidth noise floor level of the module, measured in the entire relevant frequency range.

Sometimes in the literature, the term „dynamics“ is used identically to the S/N, but this „dynamic“ value is often based on a narrow-band calculation of the inherent noise. Depending on the analysis bandwidth, *labVF6 II* will then have a much higher „dynamic“ value.

ACCESSORIES

CLL X.xx (Code 3780-xx)

- › HEADlink cable
- › LEMO 8 pin → LEMO 8 pin
- › Available cable lengths: 0.17 m, 0.26 m, 0.36 m, 0.5 m, 1 m, 1.5 m, 2.5 m, 5 m, 10 m, 20 m, 25 m, 30 m, 40 m, 50 m, 60 m

CLB I.2 (Code 9847)

- › Adapter for connecting BHS II

SCOPE OF SUPPLY

labVF6 II (Code 3752)

6-channel voltage/ICP input module of the second HEAD*lab* generation



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