



Code 3757

# labVF6-Iso II

*labVF6-Iso II* is a 6-channel HEADlab input module with HEADlink 2.0 transmission protocol for connecting voltage and IEPE/ICP sensors. The six high-impedance inputs are electrically isolated from each other and also from the digital HEADlink interface, enabling the module to be used even in electromagnetically demanding environments.



# DETAILS

## Electrical isolation

*labVF6-Iso II* provides 6 BNC inputs for direct connection of voltage or IEPE/ICP sensors. To prevent ground loops, each input is electrically isolated from both the grounds of the other inputs and the *HEADlink* interface. This enables sensors without case isolation to be used in electromagnetically demanding environments.

## High input impedance

10 MΩ DC

- › For DC measurements, *labVF6-Iso II* provides a particularly high input impedance of 10 MΩ that can be used in combination with the 10 V measurement range for resolver measurements, for example.
- › The Basic Decoder module (ASP 801) of ArtemiS SUITE can be used to decode the resolver signals.

1 MΩ AC

- › For IEPE/ICP sensors (TEDS), an input impedance of 1 MΩ is available.

## System sampling rate

The system sampling rate of a *HEADlab* system including one or more *labVF6-Iso II* or other input modules can be configured flexibly up to a maximum sampling rate of 204.8 kHz.

## HEADlink 2.0 Transmission Protocol

The maximum sampling rate of 204.8 kHz is achieved using the *HEADlink 2.0* transmission protocol. This requires that the *labVF6-Iso II* is connected to a *HEADlink 2.0*-capable controller, compact system, or similar device. Compared to the *HEADlink 1.0* transmission protocol, *HEADlink 2.0* provides twice the sampling rate with the same number of channels.

## Power supply

*labVF6-Iso II* does not require a dedicated power supply, as the input module and all connected modules (e.g., a *labCTRL II.1* controller with up to ten modules) are powered by the controller, the compact system, or other connected devices. Controllers, compact systems, and other connected devices are, in turn, powered by the supplied power adapter or by the battery of a supply module.

## Self-Sufficient

*HEAD* acoustics offers supply modules with different power levels that can be used to operate controllers, compact systems, etc. and connected modules as self-sufficient systems and protect them in the event of power failures, for example. Depending on the configuration, the battery of a supply module can power a system for several hours.

## Control (Software)

ArtemiS SUITE

- › For configuration and control purposes, *labVF6-Iso II* is connected to a controller, compact system, or another device, which is, in turn, connected to a computer via USB or LAN. The computer must have ArtemiS SUITE installed, and licenses for both APR Framework (APR 000) and Recorder (APR 040) must be available.

Browser-Based User Interface

- › The use of *labCTRL II.1* in combination with *labSAR I.1* enables *labVF6-Iso II* to be operated using only a smartphone or tablet (a network connection is required). The system is then operated through a browser-based user interface.
- › In this case, ArtemiS SUITE is not required.

# AT A GLANCE

## DATA ACQUISITION



## CONTROL / POWER SUPPLY



## POWER SUPPLY

Via HEADlink

## CONNECTION OF SENSORS

Via BNC

- › Voltage or IEPE/ICP sensors (TEDS)
- › Resolvers
- › BHM III.3 mobile headset microphone for binaural recordings
- › HSU III.2 artificial head microphone
- › Binaural headset BHS II
- › Voltage sources
- › ...

## CONNECTION TO CONTROLLER / FRONTEND / SYSTEM

HEADlink Protocol 2.0 via HEADlink

- › labCTRL II.1 controller
- › labCOMPACT12 II and labCOMPACT24 II compact systems
- › labHSU high-end 2-channel frontend (from firmware version 2.1)
- › HMS V digital head measurement system (from firmware version 2.1)

HEADlink Protocol 1.0 via HEADlink

- › labCTRL I.2 and labCTRL I.1 controllers
- › labCOMPACT12(-V1) and labCOMPACT24(-V1) compact systems
- › labHSU 2-channel frontend (up to firmware version 2.1)
- › HMS V digital artificial head measurement system (up to firmware version 2.1)
- › VMA V HEAD VISOR microphone array
- › VMA II.1 HEAD VISOR frontend

Recording and Playback System

- › SQuadriga III mobile recording and playback system (from firmware version 2.5)

# Scope of Delivery and Accessories

## Scope of Delivery

3757	labVF6-Iso II	6-channel HEADlab input module with HEADlink 2.0 transmission protocol for connecting voltage and IEPE/ICP sensors
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## Hardware Accessories

### Required (One of the Controllers Listed Below, ...)

3704	labCTRL II.1	Controller	HEADlink 2.0	Available
3701	labCTRL I.1	Controller	HEADlink 1.0	Discontinued
3702	labCTRL I.2	Controller	HEADlink 1.0	Discontinued
31020	labCOMPACT12 II	Compact system	HEADlink 2.0	Available
31021	labCOMPACT24 II	Compact system	HEADlink 2.0	Available
3708	labCOMPACT12	Compact system	HEADlink 1.0	Discontinued
3708-V1	labCOMPACT12-V1	Compact system	HEADlink 1.0	Discontinued
3709	labCOMPACT24	Compact system	HEADlink 1.0	Discontinued
3709-V1	labCOMPACT24-V1	Compact system	HEADlink 1.0	Discontinued
1502	HMS V	Digital artificial head measurement system	HEADlink 1.0 (up to firmware version 2.1) HEADlink 2.0 (from firmware version 2.1)	Available
3324	SQuadriga III	Mobile recording and playback system	HEADlink 1.0 (from firmware version 2.5)	Available
3710	labHSU	2-channel frontend	HEADlink 1.0 (up to firmware version 2.1) HEADlink 2.0 (from firmware version 2.1)	Available
7528	VMA V	HEAD VISOR microphone array	HEADlink 1.0	Available
7522	VMA II.1	HEAD VISOR microphone array	HEADlink 1.0	Discontinued

### Required (HEADlink Cables)

3780-xx	CLL X.xx	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
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### Recommended (Supply Modules)

3711	labPWR I.1	Supply module	For HEADlab systems up to max. 40 W	Available
3712	labPWR I.2	Supply module	For HEADlab systems up to max. 100 W	Available
3713	labPWR I.3	Supply module	For HEADlab systems up to max. 35 W	Available

### Recommended (Power Adapters for Supply Modules)

0623B	PS 24-60-L2 24 V, 60 W, LEMO 2-pin	Power adapter	For labPWR I.1, labPWR I.3	Available
0621B	PS 24-150-L2 24 V, 150 W, LEMO 2-pin	Power adapter	For labPWR I.1, labPWR I.2, labPWR I.3	Available

# Software Accessories

## Required (When Connecting a Controller, ... to a Computer)

50000	ASP 000	APR Framework	Basis of ArtemiS SUITE	Prerequisite
50040	ASP 040	Recorder	Universal recorder	Data acquisition

## Recommended (Modules of ArtemiS SUITE)

51302	ASP 302	Data Preparation	Measurement data preparation	Data preparation
51801	ASP 801	Basic Decoder	Extraction of signals, such as CAN FD, CAN, OBD-2, FlexRay, navigation satellite system, pulse, and resolver signals	Data preparation

50010	ASP 010	Pool Project	Interactive processing and analyzing	Data processing / analysis
50050	ASP 050	Automation Project	Automated processing and analyzing	Data processing / analysis
51001 to 51203	ASP 001 to ASP 203	Analysis modules of ArtemiS SUITE		Analysis

51101	ASP 101	Psychoacoustics - Basic Analysis	Basic psychoacoustic analyses	Psychoacoustics
51102	ASP 102	Psychoacoustics - Basic Analysis vs. Control Channel	Basic psychoacoustic analyses vs. control channels (RPM, force, ...)	Psychoacoustics
51103	ASP 103	Psychoacoustics - Advanced Analysis	Psychoacoustic analyses based on the Sottek Hearing Model	Psychoacoustics
51104	ASP 104	Psychoacoustics - Advanced Analysis vs. Control Channel	Psychoacoustic analyses based on the Sottek Hearing Model vs. control channels (RPM, force, ...)	Psychoacoustics

50440	ASP 440	Reference+	AI-supported determination of optimal reference points for experimental modal analysis	Modal analysis
50430	ASP 430	Impact Measurement	Performing impact measurements (Roving Hammer / Roving Accelerometer) for structural analyses	Modal analysis
50420	ASP 420	Modal Analysis Project	AI-supported and intuitively performable modal analysis	Modal analysis
50410	ASP 410	Shape Comparison Project	Analysis and comparison of deflection shapes	Modal analysis
50400	ASP 400	ODS Project	Animation and analysis of deflection shapes	Modal analysis

Further modules of ArtemiS SUITE (see *ArtemiS SUITE Overview data sheet*)

# Technical Data

<b>General Information</b>	
Connectors data acquisition / data generation	6 x Voltage/ICP In
Communication interfaces	1 x HEADlink
Supply connection	HEADlink
Supply voltage	10 V <sub>DC</sub> to 28 V <sub>DC</sub>
Reverse polarity protection	Yes
Max. power consumption stand-alone operation	7 W
Maximum power consumption with sensors connected	8.5 W
System sampling rate	32.768 (2 <sup>n</sup> ) kHz, 44.1 kHz, 48 kHz, 51.2 kHz
Min. to max. sampling rate @32.768 (2 <sup>n</sup> ) 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, +14 °F to +140 °F
Storage temperature	-20 °C bis +70 °C, -4 °F to +158 °F
Dimensions	148 x 48 x 183 mm (W x Hx D)
Weight	710 g

<b>HEADlink</b>	
Plug connector	1 x LEMO 8-pin
Number of interfaces	1
Supply voltage	10 V <sub>DC</sub> to 28 V <sub>DC</sub>
HEADlink version	HEADlink 1.0, HEADlink 2.0
Electrical isolation	Yes
Synchronization	32.768 (2 <sup>n</sup> ) kHz, 44.1 kHz, 48 kHz, 51.2 kHz
Maximum cable length	60 m

<b>Voltage/ICP (Analog Inputs)</b>	
Plug connector	6 x BNC
Number of channels	6
Measured quantity	Voltage
Measurement range	0.03 V <sub>p</sub> , 0.3 V <sub>p</sub> , 3 V <sub>p</sub> , 10 V <sub>p</sub> , 30 V <sub>p</sub>
Input impedance	1 MΩ AC coupling, 10 MΩ DC coupling
Coupling	DC, AC, ICP, ICP-DC
Analog high-pass filter	0.14 Hz, 1st order, ±5% 22 Hz, 2nd order, switchable, ±5%
Analog lowpass filter	1 kHz, 2nd order, switchable, ±5% 5 kHz, 2nd order, switchable, ±5%
Digital highpass filter @f <sub>s</sub> = 48 kHz, proportional to f <sub>s</sub>	0.1 Hz
Digital lowpass filter @f <sub>s</sub> = 48 kHz, proportional to f <sub>s</sub>	22.6 kHz
Resolution	32 bits
Equalization	No
Electrical isolation input/output	Yes
Electrical isolation, channel by channel	Yes
Electric strength	±40 V
ICP voltage	22.8 V
ICP current	4 mA (-7.5% / +25%)
Cable break and short-circuit detection for ICP sensors	Yes
TEDS (IEEE 1451.4) read	TEDS class 1, shared signal wire (versions 0.9 and 1.0)

<b>Voltage/ICP – Measurement Ranges (Analog Inputs)<sup>1</sup></b>						
Measurement range	0.03 V <sub>p</sub>	0.3 V <sub>p</sub>	3 V <sub>p</sub>	10 V <sub>p</sub>	30 V <sub>p</sub> AC	30 V <sub>p</sub> DC
S/N	88 dB(A)	107 dB(A)	116 dB(A)	116 dB(A)	114 dB(A)	111 dB(A)
Crosstalk at 1 kHz	-143 dB	-141 dB	-130 dB	-119 dB	-95 dB	-80 dB
THD+N	-86 dB	-104 dB	-110 dB	-97 dB	-83 dB	-80 dB
Dynamics 5 Hz analysis bandwidth	124 dB	144 dB	152 dB	152 dB	150 dB	147 dB
Input-related noise (24 kHz bandwidth)	1.69 μV	1.89 μV	6.72 μV	22.4 μV	84.6 μV	119.5 μV
DC accuracy	1.5%	0.25%	0.15%	0.1%	–	0.45%
AC accuracy at 1 kHz	1.5%	1.1%	1.1%	0.4%	0.4%	–
Frequency response 20 Hz to 20 kHz @f <sub>s</sub> = 48 kHz re 1 kHz	+0.02 dB, -0.03 dB	+0.03 dB, -0.04 dB	+0.03 dB, -0.02 dB	+0.03 dB, -0.02 dB	+0.02 dB, -0.22 dB	+0.1 dB, -0.48 dB
Frequency response 20 Hz to 40 kHz @f <sub>s</sub> = 96 kHz re 1 kHz	+0.02 dB, -0.19 dB	+0.05 dB, -0.02 dB	+0.05 dB, -0.02 dB	+0.03 dB, -0.04 dB	+0.02 dB, -0.46 dB	+0.1 dB, -0.48 dB

<sup>1</sup> Valid for: ambient temperature 23 °C, 73.4 °F (±3 °C, ±5.4 °F), operating duration ≥1 h. Vibration excitation of the device may cause deviations.

All measurement ranges are calibrated at the factory. In addition, the measurement ranges 300 mV<sub>p</sub> to 30 V<sub>p</sub> can be calibrated in the accredited calibration laboratory of HEAD acoustics GmbH in accordance with DIN EN ISO 17025.

Voltage/ICP – Measurement Ranges (Analog Inputs) <sup>1</sup>						
Frequency response 20 Hz to 80 kHz @fs = 192 kHz re 1 kHz	+0.02 dB, -1.3 dB	+0.05 dB, -0.7 dB	+0.06 dB, -0.62 dB	+0.03 dB, -0.77 dB	+0.02 dB, -1.26 dB	+0.15 dB, -1.15 dB
Linearity 0 to 80 dB below full scale	0.18 dB	0.03 dB	0.03 dB	0.03 dB	0.04 dB	0.05 dB
Linearity 0 to 100 dB below full scale	1.1 dB	0.14 dB	0.09 dB	0.1 dB	0.06 dB	0.15 dB

<sup>1</sup> Valid for: ambient temperature 23 °C, 73.4 °F (±3 °C, ±5.4 °F), operating duration ≥1 h. Vibration excitation of the device may cause deviations.

All measurement ranges are calibrated at the factory. In addition, the measurement ranges 300 mV<sub>p</sub> to 30 V<sub>p</sub> can be calibrated in the accredited calibration laboratory of HEAD acoustics GmbH in accordance with DIN EN ISO 17025.

## Dynamics

There is no standardized calculation method for the term "dynamics".

This is why the Signal-to-Noise Ratio value (SNR or S/N) is specified for *labVF6-Iso II*. This value is calculated based on the level of a sinusoidal tone with maximum modulation in relation to full bandwidth noise floor level of *labVF6-Iso II*.

In some literature, the term "dynamics" is used by analogy with the S/N value, however, this is often based on a narrow-band calculation of the inherent noise. Depending on the analysis bandwidth, *labVF6-Iso II* will then have a significantly higher „dynamic“ value.

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



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