HEAD acoustics

DATA SHEET

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 6 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.

OVERVIEW

*lab*VF6-Iso II

Code 3757

*lab*VF6-Iso II provides 6 high-impedance inputs that are electrically isolated from each other. Electrical isolation prevents ground loops and extends the range of application to electromagnetically demanding environments. In addition, the module is characterized by a high input impedance, switchable low-pass filters, and flexibly adjustable sampling rates of 2.048 kHz to 204.8 kHz.

The measurement ranges are flexibly adjustable between 30 mV and 30 V (in addition, a 10 V range is available). The overload detection and the electrical strength of 40 V provide a high-level protection against errors in the measurement setup.

KEY FEATURES

6-channel HEAD*lab* input module with HEAD*link* 2.0

Electrical isolation of the inputs from each other and also from the digital HEAD*link* interface

High input impedance

- 10 MΩ DC, e.g., for resolvers
- 1 MΩ AC, for IEPE/ICP sensors (TEDS)

Maximum sampling rate of 204.8 kHz

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

Measurement ranges: 30 mV, 300 mV, 3 V, 10 V, 30 V

Particularly favorable lower cutoff frequency: 0.14 Hz

Analog lowpass filters (switchable per 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 per channel)

Overvoltage detection for automatic disconnection of affected channels

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

Power supply via HEAD*link*

Rugged; compact design; noiseless (without fan)

APPLICATIONS

Fast and uncomplicated data acquisition using sensors even without case isolation in electromagnetic demanding environments

DETAILS

Electrical Isolation

*lab*VF6-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 HEAD*link* interface. This enables sensors without case isolation to be used in electromagnetically demanding environments.

High input impedance

10 MΩ DC

- For DC measurements, *lab*VF6-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 HEAD*lab* systems including one or more *lab*VF6-Iso II or other input modules can be flexibly adjusted up to a maximum sampling rate of 204.8 kHz.

HEAD*link* 2.0 Transmission Protocol

The maximum sampling rate of 204.8 kHz is achieved using the HEAD*link* 2.0 transmission protocol. However, *lab*VF6-Iso II must be connected to a HEAD*link* 2.0-capable controller, compact system, etc. for this purpose. Compared to the HEAD*link* 1.0 transmission protocol, HEAD*link* 2.0 provides twice the sampling rate with the same number of channels.

Power Supply

*lab*VF6-Iso II does not require its own power supply because the input module as well as all the other modules connected (e.g., a *lab*CTRL II.1 controller including a maximum of ten modules) are supplied with power from the controller, the compact system, etc. The controller and the compact systems, etc. are in turn supplied with power via the power adapter supplied or 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, *lab*VF6-Iso II is connected to a controller, compact system, etc. which is in turn connected to a computer via USB or LAN. ArtemiS SUITE must be installed on the computer and licenses for both APR Framework (APR 000) and Recorder (APR 040) must be available.

Browser-Based User Interface

- The use of *lab*CTRL II.1 in combination with *lab*SAR I.1 enables *lab*VF6-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

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
- BHS II binaural headset
- Voltage sources
- ...

CONTROL / POWER SUPPLY

POWER SUPPLY

Via HEAD*link*

CONNECTION TO CONTROLLER / FRONTEND / SYSTEM

HEAD*link* Protocol 2.0 via HEAD*link*

- *lab*CTRL II.1 controller
- *lab*COMPACT12 II and *lab*COMPACT24 II compact systems
- *lab*HSU high-end 2-channel frontend (as of firmware version 2.1)
- HMS V digital head measurement system (as of firmware version 2.1)

HEAD*link* Protocol 1.0 via HEAD*link*

- *lab*CTRL I.2 and *lab*CTRL I.1 controllers
- *lab*COMPACT12(-V1) and *lab*COMPACT24(-V1) compact systems
- *lab*HSU 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 (as of firmware version 2.5)

Scope of Delivery and Accessories

Scope of Delivery

3757	*lab*VF6-Iso II	6-channel HEAD*lab* input module with HEAD*link* 2.0 transmission protocol for connecting voltage and IEPE/ICP sensors

Hardware Accessories

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

3704	*lab*CTRL II.1	Controller	HEAD*link* 2.0	*Available*
3701	*lab*CTRL I.1	Controller	HEAD*link* 1.0	*No longer available*
3702	*lab*CTRL I.2	Controller	HEAD*link* 1.0	*No longer available*
31020	*lab*COMPACT12 II	Compact system	HEAD*link* 2.0	*Available*
31021	*lab*COMPACT24 II	Compact system	HEAD*link* 2.0	*Available*
3708	*lab*COMPACT12	Compact system	HEAD*link* 1.0	*No longer available*
3708-V1	*lab*COMPACT12-V1	Compact system	HEAD*link* 1.0	*No longer available*
3709	*lab*COMPACT24	Compact system	HEAD*link* 1.0	*No longer available*
3709-V1	*lab*COMPACT24-V1	Compact system	HEAD*link* 1.0	*No longer available*
1502	HMS V	Digital artificial head measurement system	HEAD*link* 2.0 (as of firmware version 2.1) HEAD*link* 1.0 (up to firmware version 2.1)	*Available*
3324	SQuadriga III	Mobile recording and playback system	HEAD*link*1.0 (as of firmware version 2.5)	*Available*
3710	*lab*HSU	2-channel frontend	HEAD*link* 2.0 (as of firmware version 2.1) HEAD*link* 1.0 (up to firmware version 2.1)	*Available*
7528	VMA V	HEAD VISOR microphone array	HEAD*link* 1.0	*Available*
7522	VMA II.1	HEAD VISOR microphone array	HEAD*link* 1.0	*No longer available*

Required (HEAD*link* 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	

Recommended (Supply Modules)

3711	*lab*PWR I.1	Supply module	For HEAD*lab* systems up to max. 40 W	*Available*
3712	*lab*PWR I.2	Supply module	For HEAD*lab* systems up to max. 100 W	*Available*
3713	*lab*PWR I.3	Supply module	For HEAD*lab* systems up to max. 35 W	*Available*

Recommended (Power Adapters for Supply Modules)

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

Software Accessories

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

50000	APR 000	APR Framework	Basis of ArtemiS SUITE	Required
50040	APR 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	APR 010	Pool Project	Interactive processing and analyzing	Data processing / analysis
50050	APR 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	APR 101	Psychoacoustics - Basic Analysis	Basic psychoacoustic analyses	Psychoacoustics
51102	APR 102	Psychoacoustics - Basic Analysis vs. Control Channel	Basic psychoacoustic analyses vs. control channels (RPM, force, ...)	Psychoacoustics
51103	APR 103	Psychoacoustics - Advanced Analysis	Psychoacoustic analyses based on the Sottek Hearing Model	Psychoacoustics
51104	APR 104	Psychoacoustics - Advanced Analysis vs. Control Channel	Psychoacoustic analyses based on the Sottek Hearing Model vs. control channels (RPM, force, ...)	Psychoacoustics

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

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

Technical Data

General	
Connectors data acquisition / data generation	6 x Voltage/ICP In
Communication interfaces	1 x HEAD*link*
Supply connection	HEAD*link*
Supply voltage	10 V_{DC} to 28 V_{DC}
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^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	HEAD*link*
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 to +70 °C, -4 °F to +158 °F
Dimensions	148 x 48 x 183 mm (WxHxD)
Weight	710 g

HEAD*link*	
Plug connector	1 x LEMO 8-pin
Number of interfaces	1
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

Voltage/ICP (Analog Inputs)	
Plug connector	6 x BNC
Number of channels	6
Measured quantity	Voltage
Measurement ranges	0.03 V_P, 0.3 V_P, 3 V_P, 10 V_P, 30 V_P
Input impedance	1 MΩ AC coupling, 10 MΩ DC coupling
Coupling	DC, AC, ICP, ICP-DC
Analog highpass 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_S = 48 kHz, proportional to f_S	0.1 Hz
Digital lowpass filter @f_S = 48 kHz, proportional to f_S	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
Read TEDS (IEEE 1451.4)	TEDS class 1, shared signal wire (version 0.9 and 1.0)

Voltage/ICP – Measurement Ranges (Analog Inputs)[1]						
Measurement range	0.03 V_P	0.3 V_P	3 V_P	10 V_P	30 V_P AC	30 V_P DC
S/N	88 dB(A)	108 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	1.69 µV	6.72 µV	22.4 µV	84.6 µV	119.5 µV
DC accuracy	1.5%	0.25%	0.15%	0.1%	–	0.1%
AC accuracy at 1 kHz	1.5%	1.1%	1.1%	0.4%	0.4%	–
Frequency response 20 Hz to 20 kHz @fs = 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 @fs = 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

[1] Valid for: ambient temperature 23 °C, 73.4 °F (±3 °C, ±37.4 °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_P to 30 V_P 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)[1]						
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

[1] Valid for: ambient temperature 23 °C, 73.4 °F (±3 °C, ±37.4 °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_p to 30 V_p 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 *lab*VF6-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 *lab*VF6-Iso II.

In the literature, the term "dynamics" is sometimes used by analogy with the S/N, but this is often based on a narrow-band calculation of the inherent noise. Depending on the analysis bandwidth, *lab*VF6-Iso II will then have a significantly higher „dynamic" value.

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