



Codes 31020, 31021

labCOMPACT12 II

labCOMPACT24 II

Compact multi-channel data acquisition systems of the second HEADlab generation with 12 (*labCOMPACT12 II*) or 24 (*labCOMPACT24 II*) channels for connecting analog and ICP sensors.

OVERVIEW

labCOMPACT12 II

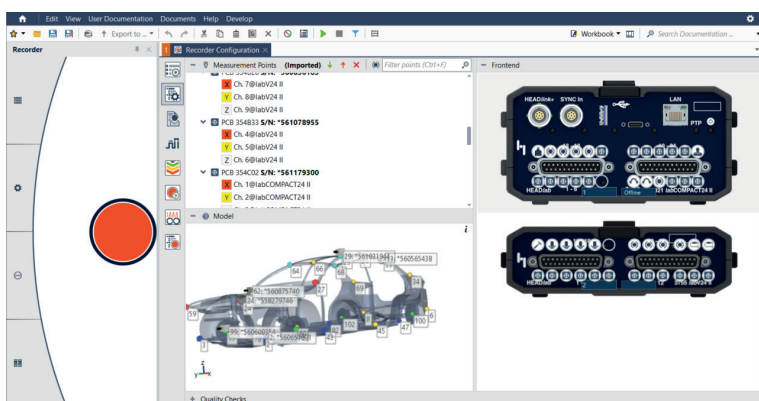
Code 31020

labCOMPACT24 II

Code 31021

labCOMPACT12 II and *labCOMPACT24 II* are compact systems that combine important functions of a second-generation HEAD*lab* controller and an input module *labV12 II* respectively *labV24 II* for analog and ICP sensors in one device. The compact systems can be quickly and easily extended with an additional input module, as well as other compact systems and controllers.

labCOMPACT12 II provides 12, *labCOMPACT24 II* 24 analog/ICP input channels that can be used with a sampling rate of up to 51.2 kHz. Both compact systems provide a maximum sampling rate of up to 204.8 kHz with the corresponding number of channels.



KEY FEATURES

Connecting up to 12 or 24 analog and ICP sensors

Data transfer and control by means of a notebook or PC

- › USB 3.1 Gen. 1
- › Gigabit LAN

Maximum sampling rate of 204.8 kHz

Switchable coupling: 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

High signal-to-noise ratio: 109 dB(A)

Control via the Recorder of ArtemiS SUITE

Direct connection of a HEAD*lab* input module via Single Link (a single HEAD*link* cable)

Easy connecting of compact systems and HEAD*lab* controllers to form larger systems

Synchronization of multiple, distributed compact systems and HEAD*lab* systems via PTP (Precision Time Protocol)

Rugged, compact design

APPLICATIONS

- › Sound quality
- › Troubleshooting
- › Sound engineering
- › Quality control
- › DC/AC voltage measurements

DETAILS

labCOMPACT12 II and *labCOMPACT24 II* are compact systems of the second generation and provide numerous improvements and innovations. The enhanced transmission protocol *HEADlink 2.0* provides twice the data rate compared to the previous protocol and 32 bits per sample. Sample rates of up to 204.8 kHz are also possible in conjunction with second-generation *HEADlab* input modules, which can be connected additionally.

Compact design

Compact systems combine the basic functions of a second-generation *HEADlab* controller with 12- or 24-channel input channels in single and handy devices. This enables flexible and affordable solutions for multi-channel analysis, particularly in the development of household appliances and office equipment.

The devices are characterized by a rugged housing. Additionally, the proven mechanical connection mechanism enables the compact systems to be easily plugged together with an input module. Like all *HEADlab* systems, the compact systems are silent (no fan).

Flexible

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

Based on the system sampling rates of 32.768 (2ⁿ) kHz, 48 kHz, and 51.2 kHz, users can freely select the sampling rate of their recordings and the resulting number of channels.

With *labCOMPACT24 II*, for example, these are as follows:

- › Up to 24 channels
with up to 32.768 (2ⁿ) kHz / 48 kHz / 51.2 kHz
- › 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

High performance

The transmission protocol *HEADlink 2.0* enables the compact systems to achieve a sampling rate of up to 204.8 kHz in combination with an additional second-generation *HEADlab* input module (connection via Single Link). The measurement data are transferred to the connected computer via a fast USB 3.1 Gen. 1 connection or Gbit LAN. First-generation input modules are fully compatible (but with limited sampling rate).

Easy-to-control

Both the configuration and operation are controlled via the Recorder of ArtemiS SUITE as of version 15.5 (APR 040 is required).

Autonomous operation

With the Power Boxes available as accessories, compact systems can be used independently. Depending on the configuration, the battery of an external Power Box supplies systems with power for several hours.

Expandable

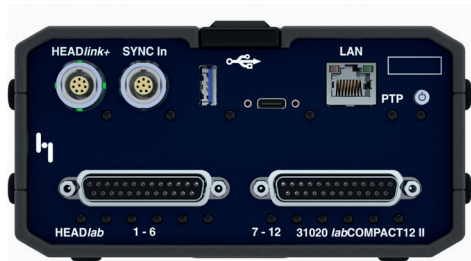
With only one *HEADlink* cable each, a compact system can be quickly and easily expanded with additional compact systems and controllers to form larger *HEADlab* systems with several hundred channels.

Networking

Distributed compact systems and second-generation controllers can be synchronized over a network with high precision using PTP (Precision Time Protocol).

ENHANCEMENTS

*lab*COMPACT12 II



*lab*COMPACT24 II



ARTIFICIAL HEADS

- › HMS V artificial head
- › HSU artificial heads
- › Via *lab*DX / CLX X.1
 - › HMS IV

CONTROLLERS

- › *lab*COMPACT12 II
- › *lab*COMPACT24 II
- › *lab*CTRL II.1
- › *lab*HSU
- › *lab*CTRL I.2

Controllers of the second and first generation are compatible.

ANALOG, ICP

Analog and ICP sensors can directly be connected with compact systems using breakout cables.

An additional *HEAD/lab* input module for analog and ICP sensors can be connected via Single Link:

- › *lab*VF6 II
- › *lab*V12 II
- › *lab*V24 II
- › *lab*V6HD

CONDENSER, ANALOG, ICP MICROPHONES

- › *lab*M6 II

THERMOCOUPLES TYPE K, RTD

- › *lab*T6

CHARGE, ICP

- › *lab*CF6

RESISTIVE MEASURING BRIDGES (STRAIN GAUGES)

- › *lab*SG6

HIGH-RESOLUTION MEASUREMENT OF ROTATIONAL SPEEDS

- › *lab*HRT6

RPM, CAN FD, CAN, OBD-2, FLEXRAY, NAVIGATION SATELLITE SYSTEMS, HMS IV, ...

- › *lab*DX

ACCESSORIES

Software

ArtemiS SUITE

as of version 15.5

- APR 000 – APR Framework (Code 50000)
 - › Required for using ArtemiS SUITE
- APR 040 – Recorder (Code 50040)
 - › Configuration and control of compact systems as well as controllers, input modules, ...
 - › HEAD Recorder is not supported

RECOMMENDED

- ASP 801 – Basic Decoder (Code 51801)
 - › Decoding signals: CAN FD, CAN, OBD-2, FlexRay, navigation satellite systems, RPM, resolver
- Additional ArtemiS SUITE software modules (APR, ASP)
 - › Processing and analyzing measurements, ...

Hardware

CONNECTION OF ANALOG SENSORS / BNC SENSORS

For *labCOMPACT12 II*

- 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, 0.3 m
- CDM I.1 (Code 3570-1)
 - › Adapter cable
 - › D-Sub 25 pin → 2 x Microtech, 1 m

For *labCOMPACT24 II*

- CDB XII-V1.1 (Code 9894-V1-1)
 - › Breakout cable
 - › D-Sub 25 pin → 12 x BNC, female, 1 m (channels 1 to 6 and 13 to 18)

CDB XII-V2.1 (Code 9894-V2-1)

- › Breakout cable
- › D-Sub 25 pin → 12 x BNC, female, 1 m (channels 7 to 12 and 19 to 24)

CDB XI-V1.1 (9893-V1-1)

- › Breakout cable
- › D-Sub 25 pin → 12 x BNC, male, 1 m (channels 1 to 6 and 13 to 18)

CDB XI-V2.1 (9893-V2-1)

- › Breakout cable
- › D-Sub 25 pin → 12 x BNC, male, 1 m (channels 7 to 12 and 19 to 24)

CDM II.1 (Code 3571-1)

- › Breakout cable
- › D-Sub 25 pin → 4 x Microtech, 1 m

CONNECTION BETWEEN COMPACT SYSTEMS, CONTROLLERS, INPUT MODULES, HMS

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

labRFC (Code 3789)

- › Active adapter for loss-free extension of HEADlink connections with a CAT cable
- › HEADlink → RJ45

labOA (Code 3785)

- › Optical adaptor (optical, electrical) for data transmission between controller → input module
- › SC/PC → SC/PC

LWL-patch cable multimode Duplex

- › Optical cable
- › SC/PC → SC/PC

CLX X.1 (Code 3797-1)

- › Adapter cable HEADlink → AES/EBU
- › LEMO 8 pin → XLR 3 pin, male, XLR 3-pol., female, 1 m

CUSB IV 2 (Code 5476-2)

- › Cable USB typ A → type C, side screw locking, 2 m

POWER SUPPLIES

PS 24-60-L4 (Code 0617B)

24 V, 60 W, LEMO 4 pin

- › For systems up to a maximum of 60 W

PS 24-150-L4 (Code 0620B)

24 V, 150 W, LEMO 4 pin

- › For systems with more than 40 W and up to a maximum of 150 W

POWER BOXES

labPWR I.1 (Code 3711)

- › For systems up to a maximum of 40 W

labPWR I.2 (Code 3712)

- › For systems up to a maximum of 100 W

labPWR I.3 (Code 3713)

- › For systems up to a maximum of 35 W

POWER SUPPLIES FOR POWER BOXES

PS 24-60-L2 (Code 0623B)

24 V, 60 W, LEMO 2 pin

- › For *labPWR I.1*, *labPWR I.3*

PS 24-150-L2 (Code 0621B)

24 V, 150 W, LEMO 2 pin

- › For *labPWR I.1*, *labPWR I.2*, *labPWR I.3*

TRANSPORT

HSC VI.2 (Code 9872)

Carrying case

SCOPE OF SUPPLY

***labCOMPACT12 II* (Code 31020)**

HEAD*lab* compact system for 12 analog and ICP sensors

- › 2 x CDB X.1 (Code 3792-1)
Breakout cable D-Sub 25 pin →
6 x BNC female, 1 m
- › Power adapter
PS 24-60-L4 (Code 0617B)
24 V, 60 W, LEMO 4 pin
- › CUSB IV 2 (Code 5476-2)
Cable USB typ A → type C, side screw locking, 2 m
- › Cable LAN, 3 m
- › HSC VI.2 (Code 9872)
Carrying case

***labCOMPACT24 II* (Code 31021)**

HEAD*lab* compact system for 24 analog and ICP sensors

- › CDB XII-V1.1 (Code 9894-V1-1)
Breakout cable D-Sub 25 pin →
12 x BNC female, 1 m
(channel 1–6 and 13–18)
- › CDB XII-V2.1 (Code 9894-V2-1)
Breakout cable D-Sub 25 pin →
12 x BNC female, 1 m
(channel 7 – 12 and 19 – 24)
- › Power adapter
PS 24-60-L4 (Code 0617B)
24 V, 60 W, LEMO 4 pin
- › CUSB IV 2 (Code 5476-2)
Cable USB typ A → type C, side screw locking, 2 m
- › Cable LAN, 3 m
- › HSC VI.2 (Code 9872)
Carrying case

TECHNICAL DATA

General		
Connectors data acquisition/ data generation		
<i>lab</i> COMPACT12 II	12 x voltage-in/ICP-in	
<i>lab</i> COMPACT24 II	24 x voltage-in/ICP-in	
Communication interfaces	1 x HEADlink, 1 x HEADlink+, 1 x Sync In, 1 x USB device, 1 x USB Host, 1 x LAN	
Supply connection	LEMO 4 pin	
Supply voltage	18 V _{DC} to 28 V _{DC}	
Reverse polarity protection	Yes	
Max. power consumption stand-alone operation		
<i>lab</i> COMPACT12 II	11.5 W	
<i>lab</i> COMPACT24 II	14 W	
Max. power consumption with sensors connected		
<i>lab</i> COMPACT12 II	18 W	
<i>lab</i> COMPACT24 II	22 W	
Max. power consumption standby	0.083 W	
System sampling rate	32.768 (2 ⁿ) 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 @48 kHz	3 kHz to 192 kHz	
Min. to max. sampling rate @51.2 kHz	3.2 kHz to 204.8 kHz	
Synchronization	Internal, Sync In, external PTP	
Max. sampling rate	204.8 kHz	
Cooling	Convection (without fan)	
Operating temperature	-10 °C to +55 °C	
Storage temperature	-20 °C to +70 °C	
Dimensions	148 x 78 x 174 mm (WxHxD)	
Weight		
<i>lab</i> COMPACT12 II	1285 g	
<i>lab</i> COMPACT24 II	1379 g	
Shock according to EN 60068-2-27	30 g, 6 axes	
Vibration according to EN 60068-2-6	5 g (5 Hz – 500 Hz)	

USB Host

Connector	1 x USB type A
Number of interfaces	1
USB specification	USB 3.1 Gen. 1
Data rate (gross)	5000 Mbit/s
Output voltage	5 V _{DC}
Output current	0.5 A
Total output power	2.5 W
Galvanic isolation	No

USB Device

Connector	1 x USB type C with lateral screw lock
Number of interfaces	1
USB specification	USB 3.1 Gen. 1
Data rate (gross)	5000 Mbit/s
Galvanic isolation	No

LAN

Connector	1 x RJ45
Number of interfaces	1
Standard	IEEE 802.3ab
Data rate (gross)	1000 Mbit/s
Galvanic isolation	Yes
Power over Ethernet	No

HEADlink

Connector	LEMO 8 pin
Number of interfaces	1
Output voltage	18 V _{DC} to 28 V _{DC} (identical to the input voltage)
Maximum output power	15 W
HEADlink version	HEADlink 1.0, HEADlink 2.0
Galvanic isolation	No
Synchronization	32.768 (2 ⁿ) kHz, 48 kHz, 51.2 kHz
Maximum cable length	60 m

HEADlink+

Connector	LEMO 8 pin
Number of interfaces	1
Output voltage	18 V _{DC} to 28 V _{DC} (identical to the input voltage)
Maximum output power	15 W
Standard	HEADlink 1.0, HEADlink 2.0, AES (via cable CLX X)
Galvanic isolation	No
Synchronization	32,768 (2 ⁿ) kHz, 48 kHz, 51,2 kHz
Maximum cable length	60 m

Voltage/ICP (analog inputs)	
Connector	2 x D-Sub 25 pin
Number of channels <i>lab</i> COMPACT12 II <i>lab</i> COMPACT24 II	12 24
Quantity	Voltage
Ranges	0.01 V _{pr} 0.1 V _{pr} 1 V _{pr} 10 V _{pr} 30 V _p
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
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 <i>lab</i> COMPACT12 II <i>lab</i> COMPACT24 II	84 dB(A) 79 dB(A)	103 dB(A) 99 dB(A)	109 dB(A) 109 dB(A)	109 dB(A) 109 dB(A)	108 dB(A) 108 dB(A)
Crosstalk <i>lab</i> COMPACT12 II <i>lab</i> COMPACT24 II	-104 dB -93 dB	-115 dB -101 dB	-131 dB -121 dB	-129 dB -120 dB	-127 dB -98 dB
THD+N <i>lab</i> COMPACT12 II <i>lab</i> COMPACT24 II	-81 dB -77 dB	-99 dB -87 dB	-108 dB -101 dB	-105 dB -103 dB	-83 dB -78 dB
Dynamics 5 Hz analysis bandwidth <i>lab</i> COMPACT12 II <i>lab</i> COMPACT24 II	121 dB 115 dB	139 dB 135 dB	145 dB 145 dB	145 dB 145 dB	144 dB 144 dB
Input related noise (24 kHz bandwidth) <i>lab</i> COMPACT12 II <i>lab</i> COMPACT24 II	0.9 µV 1.59 µV	1 µV 1.59 µV	5 µV 5 µV	50.1 µV 50.1 µV	168.7 µV 168.7 µV
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%

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.

Voltage/ICP – ranges (analog inputs) ¹					
Range	0.01 V _p	0.1 V _p	1 V _p	10 V _p	30 V _p
Frequency response 20 Hz to 20 kHz @f _s = 48 kHz re 1 kHz					
<i>lab</i> COMPACT12 II	+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
<i>lab</i> COMPACT24 II	+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, -1.2 dB
Frequency response 20 Hz to 40 kHz @f _s = 96 kHz re 1 kHz					
<i>lab</i> COMPACT12 II	+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, -3.3 dB
<i>lab</i> COMPACT24 II	+0.05 dB, -0.21 dB	+0.07 dB, -0.02 dB	+0.11 dB, -0.02 dB	+0.08 dB, -0.02 dB	+0.04 dB, -3.5 dB
Frequency response 20 Hz to 80 kHz @f _s = 192 kHz re 1 kHz					
<i>lab</i> COMPACT12 II	+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
<i>lab</i> COMPACT24 II	+0.05 dB, -0.88 dB	+0.05 dB, -0.1 dB	+0.15 dB, -0.02 dB	+0.08 dB, -0.02 dB	+0.05 dB, -7.8 dB
Linearity 0 to 80 dB below full scale					
<i>lab</i> COMPACT12 II	0.28 dB	0.05 dB	0.03 dB	0.03 dB	0.03 dB
<i>lab</i> COMPACT24 II	0.34 dB	0.05 dB	0.03 dB	0.03 dB	0.03 dB
Linearity 0 to 100 dB below full scale					
<i>lab</i> COMPACT12 II	2 dB	0.35 dB	0.08 dB	0.08 dB	0.11 dB
<i>lab</i> COMPACT24 II	2.7 dB	0.35 dB	0.15 dB	0.08 dB	0.11 dB

All measurement ranges receive a calibration by the factory. The measurement ranges 100 mV_p to 30 V_p can additionally be calibrated in the calibration laboratory of HEAD acoustics GmbH accredited according to DIN EN ISO 17025.

Dynamics

There is no standardized definition of „dynamics“.

Therefore, the Signal to Noise Ratio (SNR or S/N) value is given for the compact systems. 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 system, 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, the compact systems will then have a much higher „dynamic“ value.

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



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