Neurobit Optima+™ 4 / 2 BLE / USB
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Portable equipment for neurofeedback, biofeedback & physiological data acquisition

Highlights

Neurobit Optima is a family of highly integrated, **multimodal**, portable devices enabling measurements of physiological signals for psychological training, scientific research, education and similar applications.

They are equipped with 2-4 **versatile**, accurate, low noise measurement channels with **individually configurable** functions, sampling rates, frequency characteristics and other parameters.

High sampling rates up to 2000 sps (with 4 times faster input oversampling) allow wideband biosignals to also be captured.

The devices are available in a wireless, battery powered, **wearable version** and in a **USB powered version**, with medical grade galvanic isolation from the computer for safety and low interference.

Neurobit Optima+ models include an **extension port** for extra modality sensors: BVP, nIR HEG and pIR HEG. It also allows new digital sensors to be added in the future.

Neurobit Optima+ 4 models are also equipped with an **EEG cap interface**, with configurable connections between measurement channels and 10-20 system cap. It facilitates quick QEEG assessments and multi-site EEG training.

All Neurobit Optima devices have built-in **tests of electrode-skin impedances** and circuit continuity.

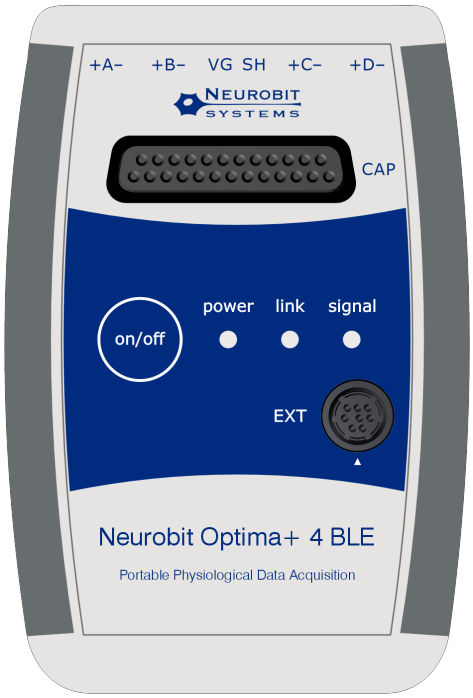
All channels have individual reference inputs, with connections to **references configured in software**.

High amplifier parameters and configurable filters of mains power noise (50 Hz | 60 Hz | off) increase **immunity to external interference**.

The equipment works with many software applications (including some freeware) for flexible, **real-time signal processing**, visualization, and storage. The **Neurobit API** allows new software to be integrated with any Neurobit device.

Our products are made in the European Union.

REMARK: Neurobit Optima devices are not medical products.



Product features

	model	NO-2 BLE	NO-2 USB	NO+2 BLE	NO+2 USB	NO+4 BLE	NO+4 USB
	product code	101015	101012	101016	101014	101025	101022
	data link	Bluetooth LE	isolated USB	Bluetooth LE	isolated USB	Bluetooth LE	isolated USB
	power	batteries		batteries		batteries	
	number of versatile channels	2	2	2	2	4	4
	built-in impedance tests	√	√	√	√	√	√
	software setup of reference inputs	√	√	√	√	√	√
	selectable frequency characteristics	√	√	√	√	√	√
	selectable time constants, incl. DC[1]	√	√	√	√	√	√
	configurable filter of mains power noise	√	√	√	√	√	√
	active shielding option	√	√	√	√	√	√
main supported modalities	EEG	√	√	√	√	√	√
	sEMG	√	√	√	√	√	√
	ECG	√	√	√	√	√	√
	EOG	√	√	√	√	√	√
	GSR	√	√	√	√	√	√
	HRV	√	√	√	√	√	√
	SCP	√	√	√	√	√	√
	RESP[2]	√	√	√	√	√	√
	breath air flow	√	√	√	√	√	√
	skin temperature	√	√	√	√	√	√
	nIR HEG[3]			√	√	√	√
	pIR HEG[3]			√	√	√	√
	BVP (PPG)[3]			√	√	√	√
	extension port			√	√	√	√
	additional channel for digital sensors[4]			√	√	√	√
	EEG cap interface[5]					√	√
	belt clip	√		√		√	
	power, link and signal state lights	√	√	√	√	√	√
	interoperation with many computer applications[6]	√	√	√	√	√	√
	remote firmware upgrade	√	√	√	√	√	√
	application program-ming interface (API)	√	√	√	√	√	√
	CE mark	√	√	√	√	√	√

Notes:

[1] *DC coupling available for the highest voltage ranges*

[2] *measurement of respiratory effort with a belt*

[3] *in channel A, via EXT port*

[4] *3rd or 5th channel; currently it enables events to be marked with a button*

[5] *with software setup of connections between 4 channels and the cap electrodes*

[6] *BioExplorer, BioEra, BrainAssistant, BrainBay, EEGer, Mind-Body Training Tools, Neurobit Recorder et al.*

Technical data[11]

Number of versatile measurement channels
- NO* 4 models 4
- NO* 2 models 2

Number of extra digital channels (NO+* models) 1

Resolution of ADC conversion 16 bits

Measurement capabilities:

Measured quantity	Application (modalities)	Measurement ranges	Accuracy[10]	Output sample rate (independent for ea. chan.)
Voltage	EEG, sEMG, HRV, EOG etc.	800 µV 6 mV 24 mV	1 %[1]	2000 | 1000 | 500 | 250 | 125 | 62.5 sps
Resistance	resistive sensors of non-electrical quantities	31.25 kΩ 125 kΩ 1 MΩ	1 %[2]	15.625 sps
Conductance	GSR (EDA) etc.	1..20 µS (µmho) 8..160 µS (µmho) 32..640 µS (µmho)	2 %[2]	15.625 sps
Temperature	skin temperature, breath airflow	-18..120 °C	0.4 °C[9]	15.625 sps
Current (NO+, chan. A)	BVP (PPG) etc.	400 nA AC 2 µA AC 25 µA DC		62.5 sps
nIR HEG (NO+, chan. A)	nIR HEG	0..200 %		62.5 sps
pIR HEG (NO+, chan. A)	pIR HEG	0..50 °C		62.5 sps

Maximum total sample stream ≥4000 sps

Oversampling factor 4 (up to 8000 sps input sample rate)

Passband[3]
- lower corner frequency (-3dB) 0 (DC)[4] | 0.01 | 0.5 Hz
- upper corner frequency (-3dB)
  - linear phase sharp frequency char. 40 % of output sample rate
  - linear phase mild frequency char. 30 % of output sample rate

Notch width of mains power noise filter[3] (-3dB) 20 % of the mains power frequency

Common mode rejection ratio (CMRR)[3, 8] >120 dB (60 Hz)

Differential input impedance[3] >10 GΩ (DC)

Differential input capacitance[3] 340 pF

Equivalent input noise[3] 1.3 µVpp (0.2 µVrms) typ.[5]

Maximum differential DC component[3, 6]	±240 mV
Frequency used for measurement of impedance, resistance and conductance	31.25 Hz
Wireless data transmission (BLE models)	Bluetooth 5.2 (2.4 GHz), class 2
Wireless link range (BLE models)	up to 10 m
Power supply	
• BLE models	2 x AA alkaline or rechargeable NiMH batteries (2.4-3 V / 0.5 A max)
• USB models	USB port (5 V / 0.3 A max)
Battery life[7] (BLE models)	30 h typ. (alkaline batteries)
USB galvanic isolation barrier (USB models)	
• Rated dielectric insulation voltage	5000 Vrms (1 minute) for SN ≥ 24000000, 2500 Vrms min. (1 minute) for SN < 24000000
• Input to output resistance	10 GΩ min.
• Input to output capacitance	15 pF typ.
Measurement sockets	Touch-Proof 1.5mm (DIN 42802-1)
EEG cap connector (NO+4 models)	DB-25, compatible with Electro-Cap products
USB port connector (USB models)	micro B 2.0
Maximum length of measurement cables	1.5 m
Maximum length of USB cable	3 m
Dimensions (L x W x D)	
• BLE models (w. clip)	117 x 79 x 32 mm
• USB models	117 x 79 x 27 mm
Weight (w. batteries)	
• NO*4 BLE models	190 g
• NO*2 BLE models	170 g
Working ambient temperature	5..40 °C

Notes:

[1] sine test signal of 8 Hz and amplitude equal to 50 % of the measurement range

[2] test value equal to 50 % of the measurement range

[3] for voltage measurements

[4] DC coupling available for 6 and 24 mV ranges

[5] EEG profile, 800 µV range, 125 sps, lower corner freq. 0.5 Hz, short-circuited inputs

[6] for AC measurements

[7] NO+4 BLE device is measuring and transmitting

[8] bipolar measurements, zero source impedance

[9] including the sensor, test temperature 25 °C

[10] the tolerance may increase by an additional 1% when exposed to electromagnetic fields specified in Table 3 of EN-IEC61326-1:2013

[11] for device SN greater than 24000000, firmware 2.9.5 and Neurobit Runtime 5.2 or newer

