

MEDELOPT® FUNCTIONAL NEUROIMAGING SYSTEMS—fNIRS WITH EEG SYSTEMS**MOBILITY**

- MOBIL 8-8
- MOBIL 8-8 EEG
- MOBIL 8-16 EEG

INFINITY

- INFIN 16-16
- INFIN 16-16 EEG
- INFIN 16-32 EEG

TANDEM

- TAND 8-8
- TAND 8-16

fNIRS SYSTEMS FOR VR

- VR 8-8
- VR 8-8 EEG

ACCESSORIES (ADAPTER KITS & TRIGGERS)

- MEDEL MOBIL PK
- MOBIL TRIG
- TRIG BOX USB
- VR ACC QUEST 2
- MEDEL SPINE



MedelOpt® research devices provide full integration of functional nearinfrared spectroscopy (fNIRS) and electroencephalogram (EEG) modalities in a wearable, self-contained headset. The unique design, developed by researchers for researchers, blends bimodality and flexi-modularity in an adaptable and self-contained system that supports a wide range of research possibilities.

The MedelOpt® line consists of four product categories: Mobility, Infinity, Tandem, and fNIRS Systems for VR.

All four categories support the following features:

- Continuous wave fNIRS technology
- Emitter/detector distances adjust from 20 to 55 mm—choose the distances and depth of channels
- Emitters/detectors can be added to headset to increase channel count
- Headset adapts to a range of head sizes (no need to purchase additional headsets)
- Sampling frequencies of 128 Hz on detectors and up to 32 Hz for emitters
- Fully integrated 8 electrode EEG with 512 Hz sampling frequency

fNIRS + EEG Advantage

fNIRS technology measures changes in oxygenation and hemodynamic response while EEG signals measure electrical neural activity. While fNIRS offers a higher degree of spatial resolution than EEG, EEG provides superior temporal resolution over fNIRS. MedelOpt® combines the advantages of both signals. The simultaneous analysis of various neural and vascular components by EEG in tandem with fNIRS makes it possible to see the mechanisms involved and their interactions by a multimodal, multidimensional approach. Additionally, this simultaneous approach combines EEG's high temporal resolution with the high spatial resolution of fNIRS.

PRODUCT CATEGORIES:

MedelOpt® Mobility

MedelOpt® Mobility headsets allow high-density mapping of EEG and fNIRS signals while study participants move freely and participate in physical exercise. Mobility wireless headset units can record up to 128 channels with unlimited range through WiFi connectivity. The Mobility line includes the following three models, all of which are designed for applications that require the study participant to have freedom of movement:

- MOBIL 8-8
- MOBIL 8-8 EEG
- MOBIL 8-16 EEG



MedelOpt® Infinity

MedelOpt® Infinity headsets provide whole-brain mapping with up to 512 channels recording from up to 16 emitters and 32 detectors, allowing custom advanced montages at variable depths. Infinity line includes the following:

- INFIN 16-16
- INFIN 16-16 EEG
- INFIN 16-32 EEG



MedelOpt® Tandem

MedelOpt® Tandem Systems provide two (2) headsets for synchronized acquisitions, hyperscanning, and social interactions. MedelOpt® Tandem's dual-headset design and high-density hyperscanning from 256 to 1024 channels make it ideal for brain synchronization studies. Tandem can be used for research applications with regions of interest from prefrontal to the cerebellum and through the parietal and lateral cortex. The Tandem line includes the following models:

- TAND 8-8 (64 theoretical channels with each headset)
- TAND 8-16 (128 theoretical channels with each headset)



MedelOpt® fNIRS Systems for VR

MedelOpt® Systems for VR offer an integrated solution for Virtual Reality with NIRS or NIRS+EEG. Combining VR with fNIRS allows researchers to measure brain activity in response to simulated environments, providing insights into how the brain processes and reacts to different stimuli. Researchers can study the effects of VR on attention, memory, decision-making, and emotional response. The flexible, adaptable headset supports acquisition for up to 8 hours. Use for research applications with regions of interest from prefrontal to the cerebellum and through parietal, and lateral cortex. Integrate MedelOpt® with other physiological data from BIOPAC devices for multimodal data acquisition. fNIRS Systems for VR include the following models (**Note: VR Systems are sold separately**):

- VR 8-8
- VR 8-8 EEG

fNIRS Systems for VR include the following features:

- Virtual reality headset: Meta Quest2 + Elite Strap
- 8 emitters / 8 receivers
- 2 short channels
- If purchased: EEG
- Control ebox unit
- EIOpt Software
- Mobility Pack (MiniPC + Battery)
- Integration accessories



MedelOpt® Mobility Pack — MEDEL MOBIL PK

This pack provides Mini PC + Battery + USB cable to create a mobile system from an existing MedelOpt Infinity or MedelOpt Tandem system to increase the mobility range and protocol options for experiments.

The Mini PC connects to the MedelOpt electronics box and can be used with remote wireless connection (Wi-Fi) or connected to an external screen (not provided) and keyboard (not provided).

Mini PC includes the following:

- Power LED
- USB for the electronic box
- USB for optional trigger
- Micro USB for power supply
- Power button
- HDMI for screen (not included)



MedelOpt Mobility Pack
Mini PC



MedelOpt® Triggers — TRIG BOX USB & MOBIL TRIG

Use these optional trigger accessories to add event marking to a MedelOpt System.

MOBIL TRIG

Wireless USB for mobile MedelOpt systems:
Mobility or fNIRS Systems for VR.

Includes the following:

- Wireless trigger Emitter
- Wireless trigger Receiver
- 2 x USB-A to micro USB-B cable (short)

MOBIL TRIG Wireless USB



TRIG BOX USB

*USB Trigger Box with USB Isolator for
tethered MedelOpt systems: Infinity or
Tandem*

Includes the following:

- MedelOpt Trigger Box Mini USB
- USB-A to mini USB-B cable

TRIG BOX USB Trigger Box



For detailed trigger specs, see below.

Adapter Kit — MedelOpt® to QUEST 2 or 3 HMD

Use this kit to adapt an existing MedelOpt Mobility 8/8 System to an existing Meta Quest 2 or 3 HMD with Elite Strap. Remove some parts on the exoskeleton headset to fit the Meta Quest 2 or 3 HMD using the accessories.

Kit includes the following:

- VR Arch x1
- Holder 3 footprints
- Control ebox unit + HMD Holder
- Wire Protection Sleeve



Adapters also available for other HMD models—contact BIOPAC for specific need.

MEDEL SPINE — MedelOpt® Replacement Spine

Replacement central spine and nose clip for the MedelOpt exoskeleton for fNIRS/EEG Systems.

SYSTEM-SPECIFIC SPEC COMPARISON

Product Category	System	Emitters/ Detectors	EEG	Wireless	Short Channel	Use Cases
Mobility	MOBIL 8-8	8/8	no	yes	1	Mobile applications demanding greater degrees of subject freedom, high-density mapping up to 128 channels
	MOBIL 8-8 EEG	8/8	yes	yes	1	
	MOBIL 8-16 EEG	8/16	yes	yes	1	
Infinity	INFIN 16-16	16/16	no	optional	≤16	In lab applications, whole brain mapping up to 512 channels and custom advanced montages with variable depths
	INFIN 16-16 EEG	16/16	yes	optional	≤16	
	INFIN 16-32 EEG	16/32	yes	optional	≤32	
Tandem	TAND 8-8	8/8 (each headset)	no	no	1 each headset	Two headsets for synchronized high-density hyper scanning, 128 to 512 channels each headset
	TAND 8-16	8/16 (each headset)	no	no	1 each headset	
VR	VR 8-8	8/8	no	Yes	2	Study the effects of VR on attention, memory, decision-making, and emotional response. Research applications with regions of interest from prefrontal to the cerebellum and through parietal, and lateral cortex
	VR 8-8 EEG	8/8	Yes	Yes	2	

TRIGGER SPECIFICATIONS (TRIG BOX USB & MOBIL TRIG):**TRIGGER Auxiliary input**

Number of channels:	2
Input voltage:	TTL Low = 0 V, High =[3.3 ; 5] V
Input impedance:	300 Ω
Acquisition frequency:	512 Hz
Opto-isolator insulation rating:	5 kV rms for 1mn
Trigger cable length:	1.9 m
Trigger weight (without cable):	20 g
Trigger dimension:	54 x 22.5 x 2 mm
Protection rating:	IPX0

Propagation delay

MOBIL TRIG:	Min: 2.6; Typical: 3.3; Max: 20; Unit: ms
TRIG BOX USB:	Min: 1.2; Typical: 1.3; Max: 1.5; Unit: ms

USB Isolator – TRIG BOX USB only

Isolation:	5000 Vdc 1 second, 4000 Vrms 1 minute, permanent working range 250 Vrms
Transient protection:	Integrated protection diodes with approval of ± 12 kV acc. to IEC 61000-4-2
Certification:	EN60601-1:2007, 3rd Edition, CE, FCC
Energy transfer:	Primary to secondary max. 2.5 W, 500 mA, about 75% efficiency, short circuit proof
Coupling capacity:	About 1.5 nF
Data transmission:	USB 1.1/2.0 compatible full speed (12 Mbit/s)

Environment

Operating temperature:	10–40°C
Transport and storage temperature:	0–50°C
Operating humidity:	0% ~ 70%, non-condensing
Transport and storage humidity:	0% ~ 90%, non-condensing
Operating altitude:	up to 3,000 m
Current consumption:	Max. 1.0 A

COMMON SPECIFICATIONS (MOBILITY, INFINITY, TANDEM, & VR SYSTEMS):**Electronic Box Dimensions:** 22 mm x 85 mm x 48 mm**Environment:**

Operating temperature: 10–40°C (50–104° F)
Transport and storage temperature: 0–50° C (32–122° F)
Operating humidity: 0% ~ 70%, non-condensing
Transport and storage humidity: 0% ~ 90%, non-condensing
Operating altitude: Up to 3,000 m

Power requirements

Voltage: 5 V DC micro USB
Current consumption: Max. 1.0A

EEG (If included)

Sampling rate: 512 samples/sec.
Number of channels: 8 + 1 reference + 1 active ground
ADC resolution: 24 bits
Amplifier gain: 24 V/V
CMRR (Common Mode Rejection Ratio): -110 dB min.
Input impedance: 500 MΩ || 10 nF
Input-referred noise (0.01Hz to 70Hz): 1 µVpp typ.
Full-scale input voltage: 187.5 mV

NIRS

Sampling rate: 128 Hz ; Light Activation rate 4, 8, 16 or 32 sample/sec.
Receivers: Silicon Photodiodes
Emitters: LEDs dual wavelength
Wavelength: 660 & 850 nm
Cable length NIRS: Shielded cable Length > 60 cm
Light Source: LED IR, class: Risk group GR0 according to IEC 62471
ADC resolution: 16 bits
Transimpedance amplifier gain: 0.5 e+9 V/A
Dark offset: 1 mV typ.
Dark offset noise: 283 µVRMS
Sensitivity: 290 V/µW at λ=900 nm
Frequency response (-3dB): 130 Hz typ.

Auxiliary input

Sampling rate: 256 samples/sec.
Number of channels: 2
Input impedance: 600 Ω
Input voltage: 0/+5 V TTL