

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

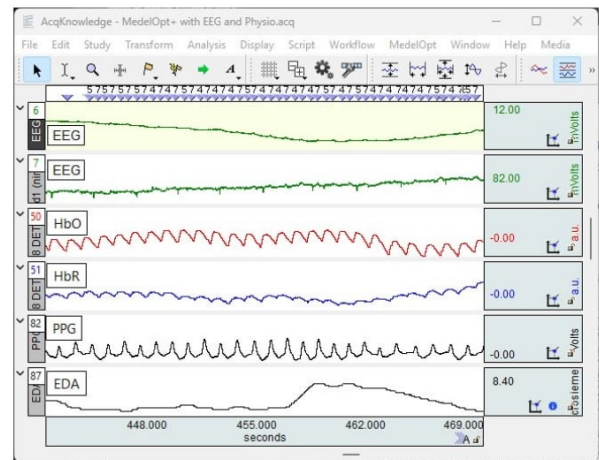
- TAND+ 8-8
- TAND+ 8-16

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



MedelOp+® research devices provide complete integration of functional near-infrared spectrography (fNIRS) and electroencephalogram (EEG) modalities in a wearable, self-contained headset. The unique design, developed by researchers for researchers, blends bimodality and flexi-modularity into an adaptable, 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
- Precision setup tools deliver ±2.9 mm accuracy
- Source/detector distances adjust from 20 to 55 mm—choose the distances and depth of channels
- Sources/detectors can be added to the 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 sources
- 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 engage in physical activities. Mobility wireless headset units can record up to 128 source-detector pairs over an unlimited range via WiFi. On-device logging maintains recording without interruption; if the live preview drops, the headset continues recording to onboard memory without data loss. Mobility allows complete freedom of movement. Mobility systems integrate *AcqKnowledge* and BioNomadix wireless physiology to synchronize brain-body recordings with MedelOpt fNIRS+EEG, alongside ECG, EMG, EDA, respiration, and more. The Mobility line includes:

- 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 sources and 32 detectors, allowing custom, advanced montages at variable depths. Flexible geometry supports variable source-detector separations, including short-channel separation and advanced high-density montages. Optional 8-channel EEG provides synchronized multi-modal recordings. *AcqKnowledge* integration creates a synchronized brain-body platform for recording fNIRS and EEG alongside ECG, EMG, EDA, respiration, and more. The Infinity line includes the following models:

- 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 128 to 256 channels make it ideal for brain synchronization studies. Tandem can be used for research applications spanning regions of interest from the prefrontal cortex to the cerebellum, including the parietal and lateral cortex. The Tandem line includes the following models:

- TAND+ 8-8 (128 theoretical channels with each headset)
- TAND+ 8-16 (256 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. This allows researchers to measure brain activity in response to simulated environments and assess the effects of VR on attention, memory, decision-making, and emotional responses. The flexible, adaptable headset supports up to 8 hours of acquisition. 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 Quest3 + Elite Strap (other brands available on demand)
- 8 sources / 8 detectors
- 2 short channels
- If purchased: EEG
- Control ebox unit
- AcqKnowledge - Medelopt Software
- MedelOpt+ 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 a remote wireless connection (WiFi) or with 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 cable for screen



MedelOpt Mobility Pack
Mini PC



MedelOpt+® Triggers — TRIG BOX+ USB & MOBIL+ TRIG

With the MedelOpt+® architecture, synchronization and event triggering are seamlessly handled through AcqKnowledge software hardware platform, using the MedelOpt+ Trigger Box.

MOBIL+ TRIG

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

Includes the following:

- Wireless trigger Source
- Wireless trigger Detector
- 2 x USB-A to micro USB-B cable (short)



TRIG BOX+ USB

USB Trigger Box with USB Isolator for tethered MedelOpt+ systems: Infiniti or Tandem

Includes the following:

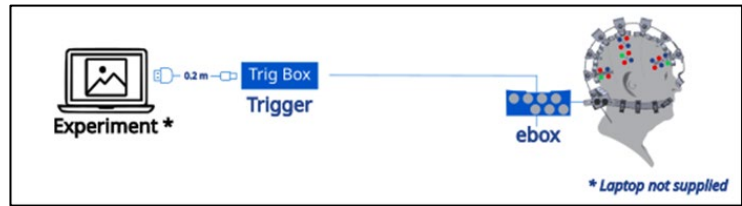
- MedelOpt+ Trigger Box Mini USB
- USB-A to mini USB-B cable



For detailed trigger specs, see below.

AcqKnowledge Integration

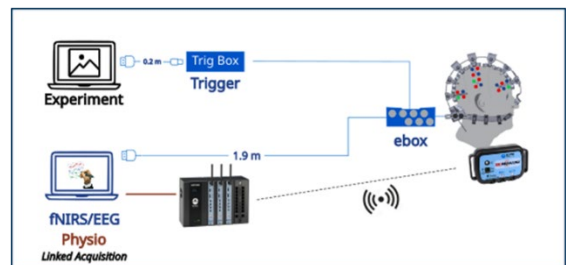
AcqKnowledge acts as the control hub, managing event markers and synchronizing MedelOpt+ with other data streams. Experimental events can be sent directly to AcqKnowledge using the MedelOpt+ Trigger Box (USB COM Port), ensuring that all brain signals—fNIRS and EEG—are synchronized with the experiment. Synchronization with the MP modules is performed through the AcqKnowledge Linked Acquisition protocol, ensuring all signals are time-aligned within a single unified software environment.



MedelOpt+ Trigger Box can be expanded when the configuration involves multiple synchronized systems (Tandem, hyperscanning). This flexibility allows researchers to expand from simple single-device experiments to multi-participant, multimodal studies while preserving accurate timing.

MP200 Hardware Connection

When systemic physiology or external sensors are part of the experiment, MedelOpt+ can be synchronized to the MP200 acquisition system directly in AcqKnowledge. The Linked Acquisition Protocol included in AcqKnowledge enables the management of both the MP200 and MedelOpt+ modules from a single running instance of AcqKnowledge. This allows the recording of brain and body signals in perfect temporal alignment. Physiology, behavioral markers, and fNIRS/EEG signals can all be synchronized without additional integration steps.



Adapter Kit — MedelOpt+® to QUEST 2 or 3 or HTC VIVE 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 or HTC VIVE HMDs using the accessories.

Kit includes the following:

- VR Arch x 3
- Sensors Holders 2 - 3 - 4 footprints
- Control ebox unit + HMD Holder x 1
- Short Channel Limiter x 2
- Strap holder x 3



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

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	Sources/ 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 rage 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**Safety & regulatory**Photobiological safety: IEC 62471, Risk Group 0
Electrical safety: IEC 60601-1
EMC: IEC 60601-1-2 (declarations on request)
EEG: IEC_80601-2-26
RoHS**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**fNIRS subsystem**Sampling rate: 4/8/16/32 Hz acquisition sampling rate depending on source duty cycle.
Detectors: Low-noise pre-amplified Si photodiodes
Sources: 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: 512 samples/sec.
Number of channels: 4
Input impedance: 600 Ω
Input voltage: 0/+5 V TTL