NIRSBOX

Time-resolved spectroscopy system

Specification sheet

APPLICATIONS

- Hemodynamic monitoring of brain and muscle tissues
- Brain functional activation measurements
- Optical non-invasive characterization of diffusive media
- Quality assessment of food and vegetables

Version 2.0 (September 2022)

LIGHT EMISSION

- 2-wavelengths: 685 nm and 830 nm (nominal)
- Instrument response function: < 200 ps (FWHM) [1]
- Minimum laser output power (average): 5 mW [1]
- Laser repetition frequency: 53 MHz
- Automated optical attenuators (5 OD dynamic range)
- Measurement stability better than ±1% over more than 6 hours of operation

([1] at instrument output ports, may be subject to further improvements)

LIGHT DETECTION

- One detection channel, with solid-state detector
- Photosensitive active area size: 1.3 x 1.3 mm^2
- No damages if exposed to strong light (even ambient)
- DToF curves measurement resolution (bin-size): 9.77 ps
- Maximum conversion rate: 2.5 Mconv/s [2]
- Single DToF integration time: from 100 ms to 5 s [2]
- Reproducibility: < 2% (CV) on phantoms [2]

([2] may be subject to further improvements)

SOFTWARE

- MS Windows OS -based data acquisition software
- DLLs available (both for MS Windows and Linux)
- DToF curves are stored in binary files [3]
- Real-time data fitting, for retrieving optical parameters (using a homogeneous semi-infinite model)
- Fitting results are stored in a .txt file [3]

([3] customizable upon request)

CONNECTIONS

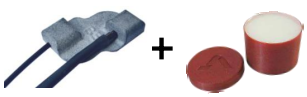
- USB 2.0 communication interface
- 4x programmable, low-frequency digital input/outputs
- 2x optional analog outputs, for external data logging
- Fiber connections to the instrument optical ports: FC/PC for 1 mm core POF fibers
- Light emission optics for 100 µm core silica fibers can also be provided

DIMENSIONS	• Size: 200 mm (W) x 120 mm (H) x 245 mm (L) • Weight: approx. 3 kg
POWER SUPPLY	• Input voltage: 18 VDC • Maximum input current: 3.5 A • Optional internal battery pack (5+ hours operation)

OPTICAL PROBES

B5 COMPACT PROBE 	• 30 mm Source/Detection separation • PIONIRS 1-mm optical fibers only • Medium or high flexibility • Dedicated IRF-box • Size: 37.7 mm (W) x 28.5 mm (L) x 6.5 mm (H)
S1-FC PROBE 	• 30 mm Source/Detection separation • 2x FC/PC optical fiber connectors • Medium flexibility • Removable optical fibers design • Dedicated IRF-box • Size: 48 mm (W) x 20 mm (L) x 11.3 mm (H)

ACCESSORIES

TEST PHANTOM 	• Optical parameters (typical): μ_a = 0.1 cm^{-1}, μ'_s = 10 cm^{-1} [4] • Rigid, dust-proof surface • Stable, long-lasting material and optical properties • Size: 61 mm (diameter) x 43 mm (height) ([4] customizable upon request)
BASIC MEASUREMENT KIT 	• Standard B5 compact optical probe • Dedicated IRF box • 1.5 m fiber length • Calibration phantom