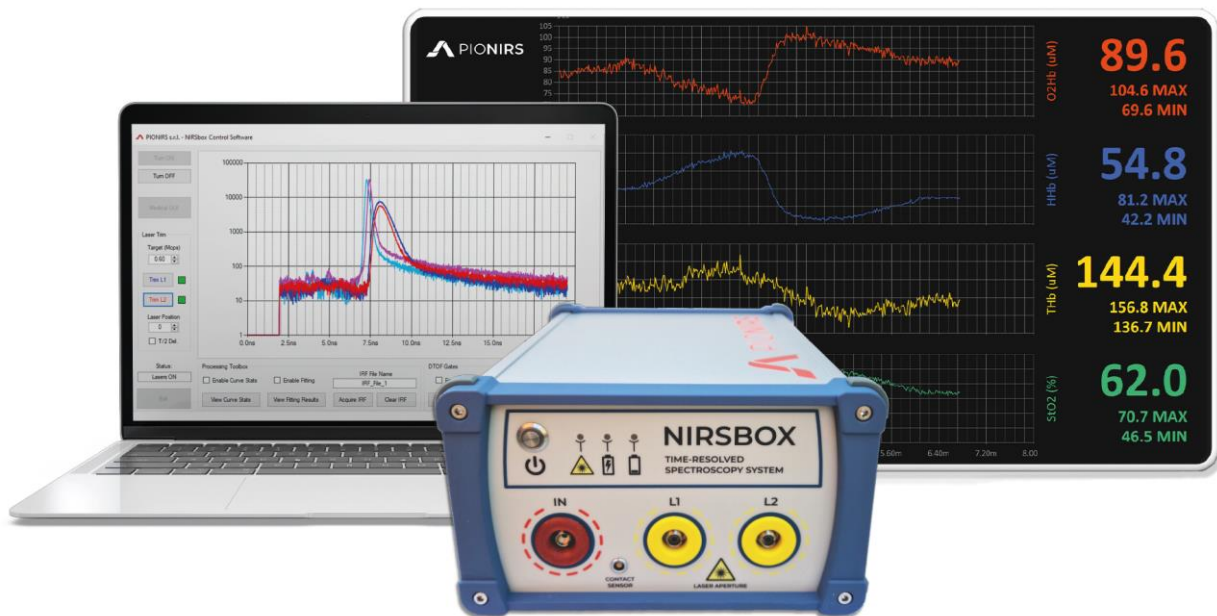


# NIRSBOX

## 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)*

*Product intended to be used for research applications only, not sold as medical device. Product not intended to be used for diagnosis or disease treatments. Specifications and data are preliminary and may be subject to changes, to improve function, reliability or design. © PIONIRS s.r.l. 2022.*

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## LIGHT EMISSION

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

(<sup>1</sup> at instrument output ports, may be subject to further improvements)

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## LIGHT DETECTION

- One detection channel, with solid-state detector
- Photosensitive active area size: 1.3 x 1.3 mm<sup>2</sup>
- 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 <sup>(2)</sup>
- Single DToF integration time: from 100 ms to 5 s <sup>(2)</sup>
- Reproducibility: < 2% (CV) on phantoms <sup>(2)</sup>

(<sup>2</sup> may be subject to further improvements)

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## SOFTWARE

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

(<sup>3</sup> customizable upon request)

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## 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  $\mu$ m core silica fibers can also be provided

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## DIMENSIONS

- Size: 200 mm (W) x 120 mm (H) x 245 mm (L)
- Weight: approx. 3 kg

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## POWER SUPPLY

- Input voltage: 18 VDC
- Maximum input current: 3.5 A
- Optional internal battery pack (5+ hours operation)

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## 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)

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### 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)

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## ACCESSORIES

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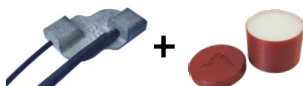
### TEST PHANTOM



- Optical parameters (typical):  $\mu_a = 0.1 \text{ cm}^{-1}$ ,  $\mu'_s = 10 \text{ cm}^{-1}$  <sup>(4)</sup>
  - Rigid, dust-proof surface
  - Stable, long-lasting material and optical properties
  - Size: 61 mm (diameter) x 43 mm (height)
- <sup>(4)</sup>customizable upon request

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### BASIC MEASUREMENT KIT



- Standard B5 compact optical probe
- Dedicated IRF box
- 1.5 m fiber length
- Calibration phantom