Prototype technical features

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An optical neuro-monitor of cerebral oxygen metabolism and blood flow for neonatology

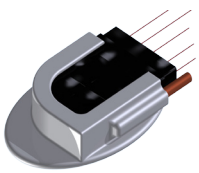
Near–infrared diffuse correlation spectroscopy (DCS) & time resolved near-infrared spectroscopy (TRS)

combined in a portable device for non–invasive cerebral oxygen metabolism & blood flow monitoring

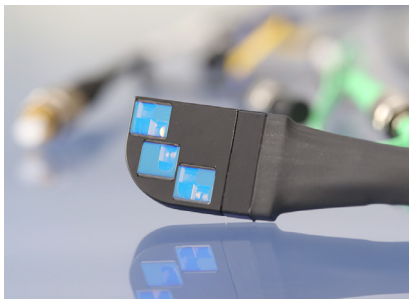
BabyLux takes up complete R&D works and **extends already tested prototypes to the level of demonstrator**, bridging the gap between research products and commercialization. The project aims to provide a non-invasive, portable and highly reliable tool, easy to operate by busy clinical staff. The device can be brought to the bedside, measurements can be done in a few minutes and repeatedly, if the condition is critical.

The system is based on near-infrared diffuse correlation spectroscopy (DCS) and time resolved near-infrared spectroscopy (TRS). Both technologies work in a wavelength range called the “physiological window” (600nm-900nm) which allows to reach deeper tissue layers, sampling at the depth of the cerebral cortex. DCS provides tissue hemodynamic information, the local micro-vascular cerebral blood flow (CBF), and TRS measures locally the optical tissue properties allowing to deduce information on oxygen saturation and total hemoglobin concentration. By this innovative combination of an accurate state-of-the-art TRS and DCS for the first time in a single robust instrument a set of information for monitoring the local cerebral oxygen metabolism becomes accessible.

The study has been approved by the Danish Medical Agency (pending approval by the Italian Ministry of Health).



BabyLux TRS/DCS HYBRID Sensor. Dimensions 40x26mm.



TRS/DCS HYBRID SENSOR, second prototype.

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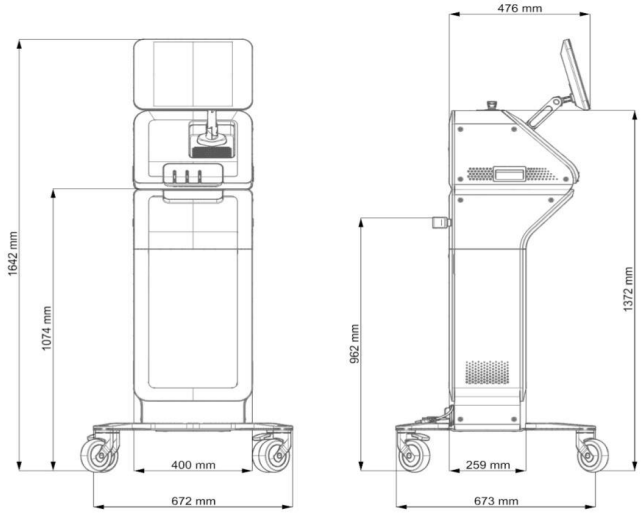
Essential features:

1 The **stand-up configuration** is the main configuration to be used in normal conditions, though it can be used in a **desktop position** as well. Both modules (main and battery module) are connected to preserve the basic functions of the device without electrical power connection and avoid set-up times between device uses and movements.
The main module and the battery module can also be detached in order to use the main module in the desktop position as a stand-alone device.

2 With its bottom trolley, the device is **easily movable** by means of the rear handle. For final placement, the two wheel lock system assures stable positioning in the ICU room.



3 The main idea is to have an intermediate clamp between the device and the head sensors to be fixed in the cot. This is **more comfortable for the baby** for not adding any weight of fibres to the sensor, in particular when he/she moves the head. Moreover, it avoids that any accidental movement of the fiber strains the baby's head.

4 The **graphical user interface and data representation** is designed for two principal application scenarios. First, as an easy control monitor with large number representation of main parameters and second, as continuous monitor providing graphical representation of the parameter evolution over time. Furthermore, additional information is offered on demand by changing between the main window and secondary windows.

BabyLux

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